

SLOTS:

RECEPTACLES

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	103		104	150	115	117	117	114	118	118	121	121	122
2													
3													
4													
5													
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26													
27													
28													
29													
30													
31													

SHIELDED

MONITOR  
GENERAL

SWITCH  
GENERAL

SWITCH  
GENERAL

HEIGHT

WIDTH

90°

VEHICLE  
POSITION

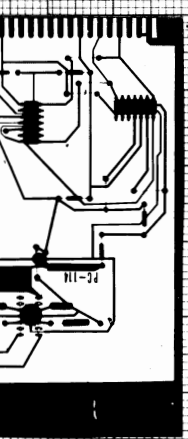
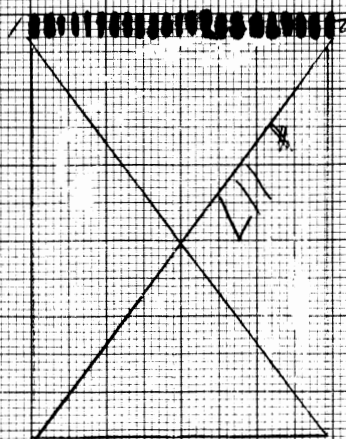
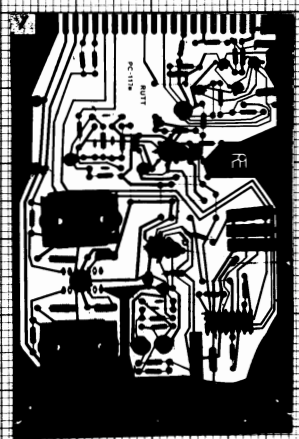
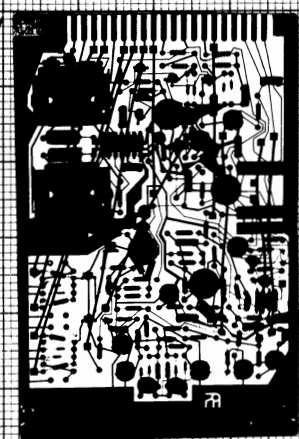
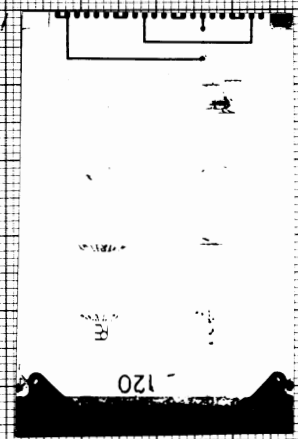
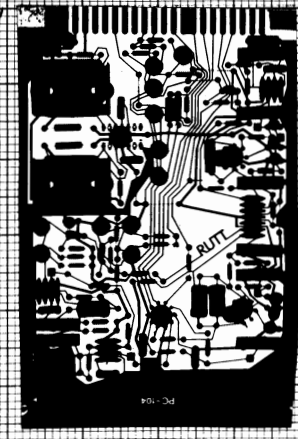
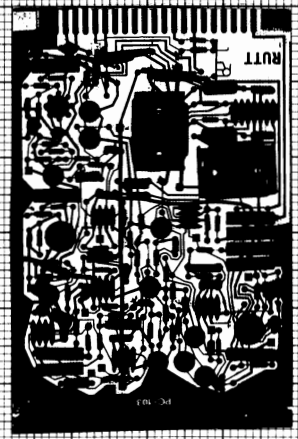
POSITION

DEFINITION

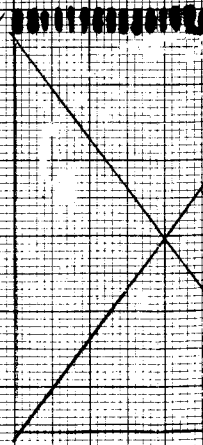
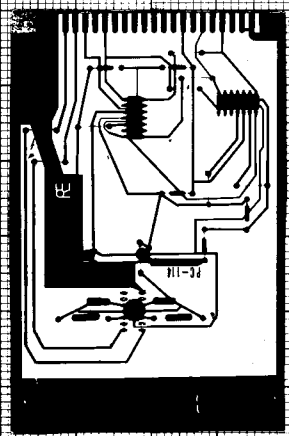
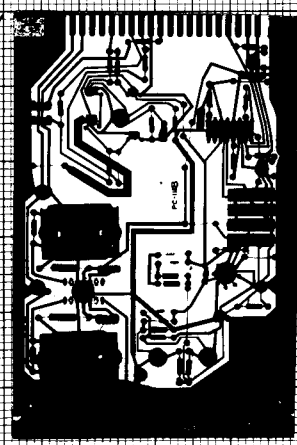
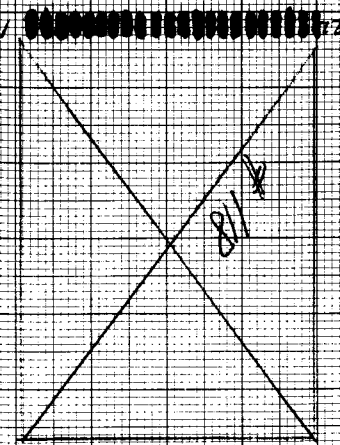
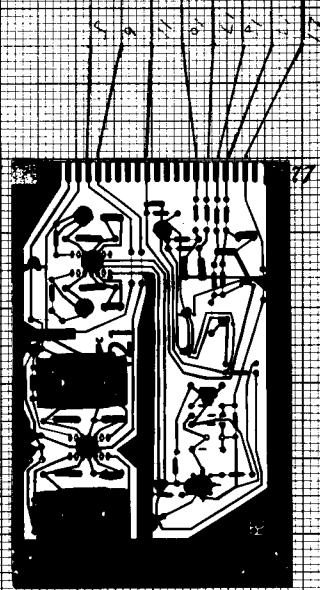
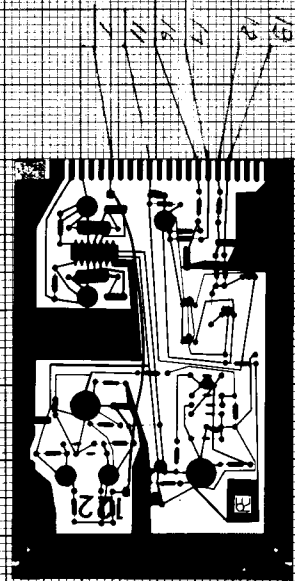
INTENSITY

17.12  
HOLLOMAN  
10400-10400

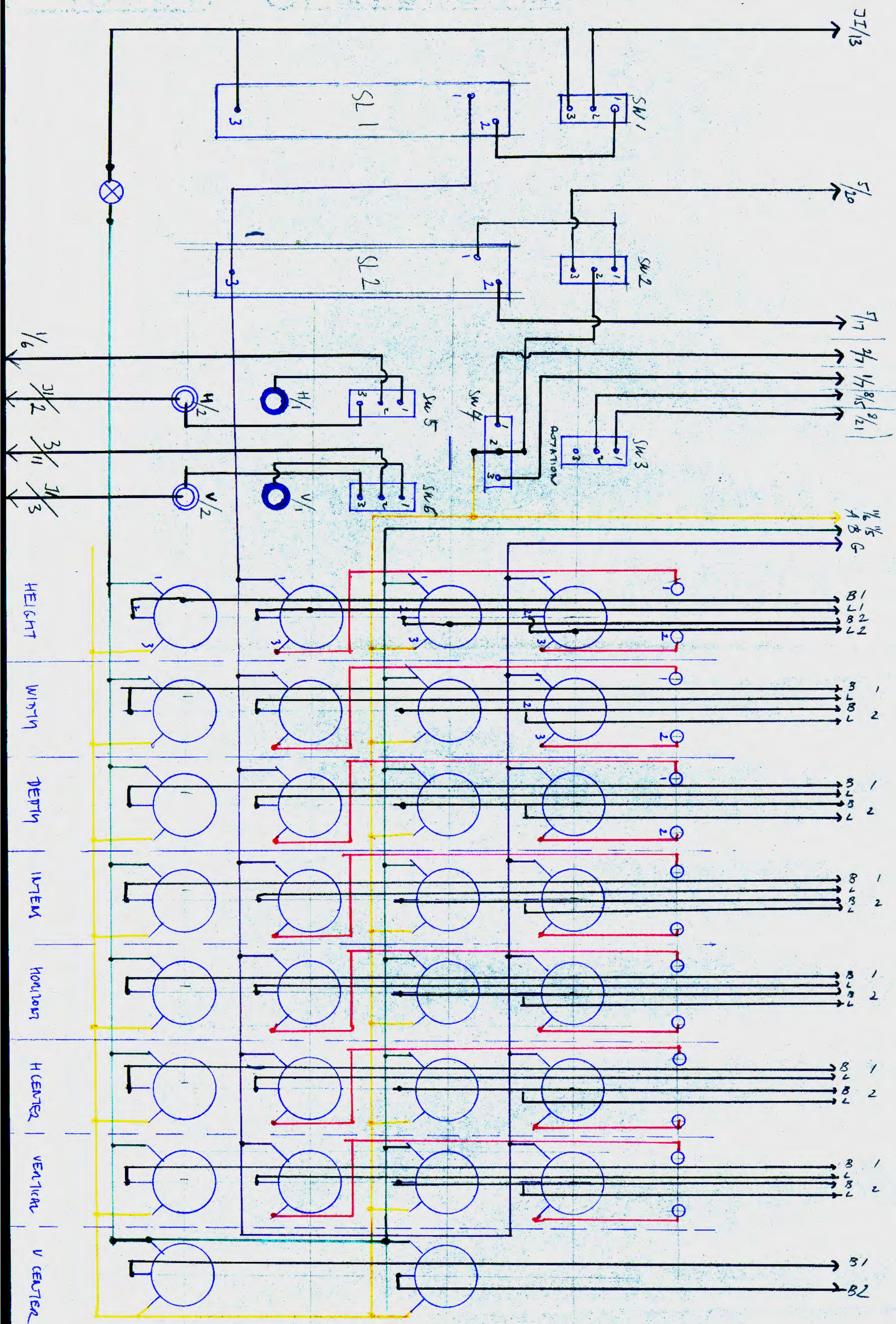
17.12  
HOLLOMAN  
10400-10400













# MODULE MULTIPLIER PARTS LIST

DEC. 1974

*2/1/74*

IC-1 MC-1494 R-1 27K  
IC-2 LM318 R-2 15K  
IC-3 " R-3 12K  
IC-4 " R-4

D-1 1494 R-5 20K POT

D-2 1494 R-6 20K POT

D-3 " R-7 20K POT

D-4 " R-8 47K

D-5 " R-9 10K

D-6 " R-10 10K

Q-1 NPN 2N3568 R-11 10Ω

Q-2 PNP 2N3638 R-12 10Ω

Q-3 NPN R-13 100K POT

Q-4 PNP R-14

C-1 10PF R-15 10K 5%

C-2 10PF R-16 10K 5%

C-3 15μF 20V R-17 10K

C-4 15μF 20V R-18 10K

C-5 10PF R-19 10Ω

C-6 .1cer R-20 10Ω

C-7 .1cer R-21

C-8 10PF R-22 6.8K

Q-1 NPN 2N3568 R-23 20K

Q-2 PNP 2N3638 R-24 6.8K

Q-3 NPN 2N3568 R-25

Q-4 PNP 2N3638 R-26 10K

Q-5 FET R-27 20K

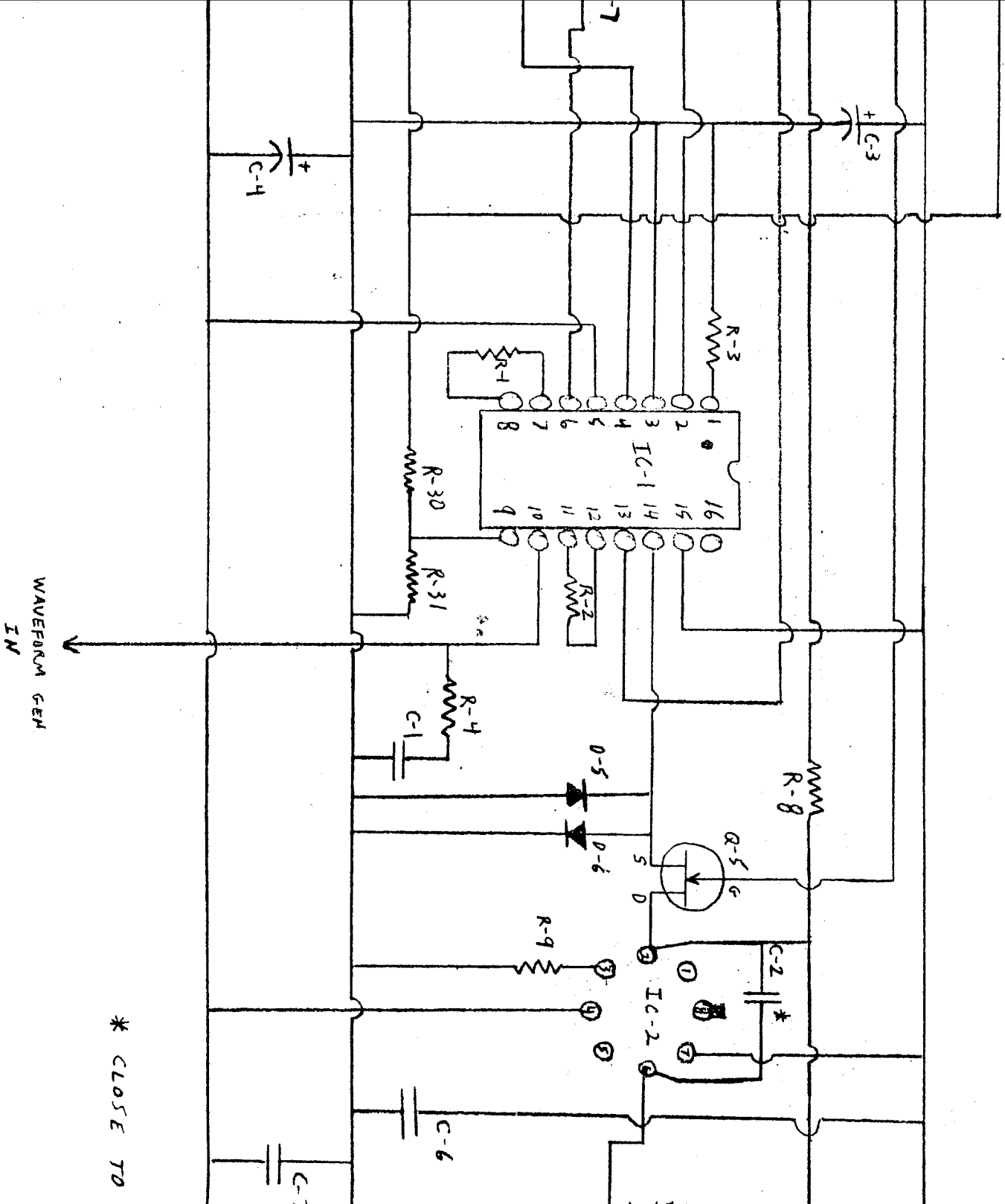
Q-6 NPN 2N3568 R-28 15K

Q-7 NPN 2N3568 R-29 10K

Q-8 NPN 2N3568 R-30 2.2K

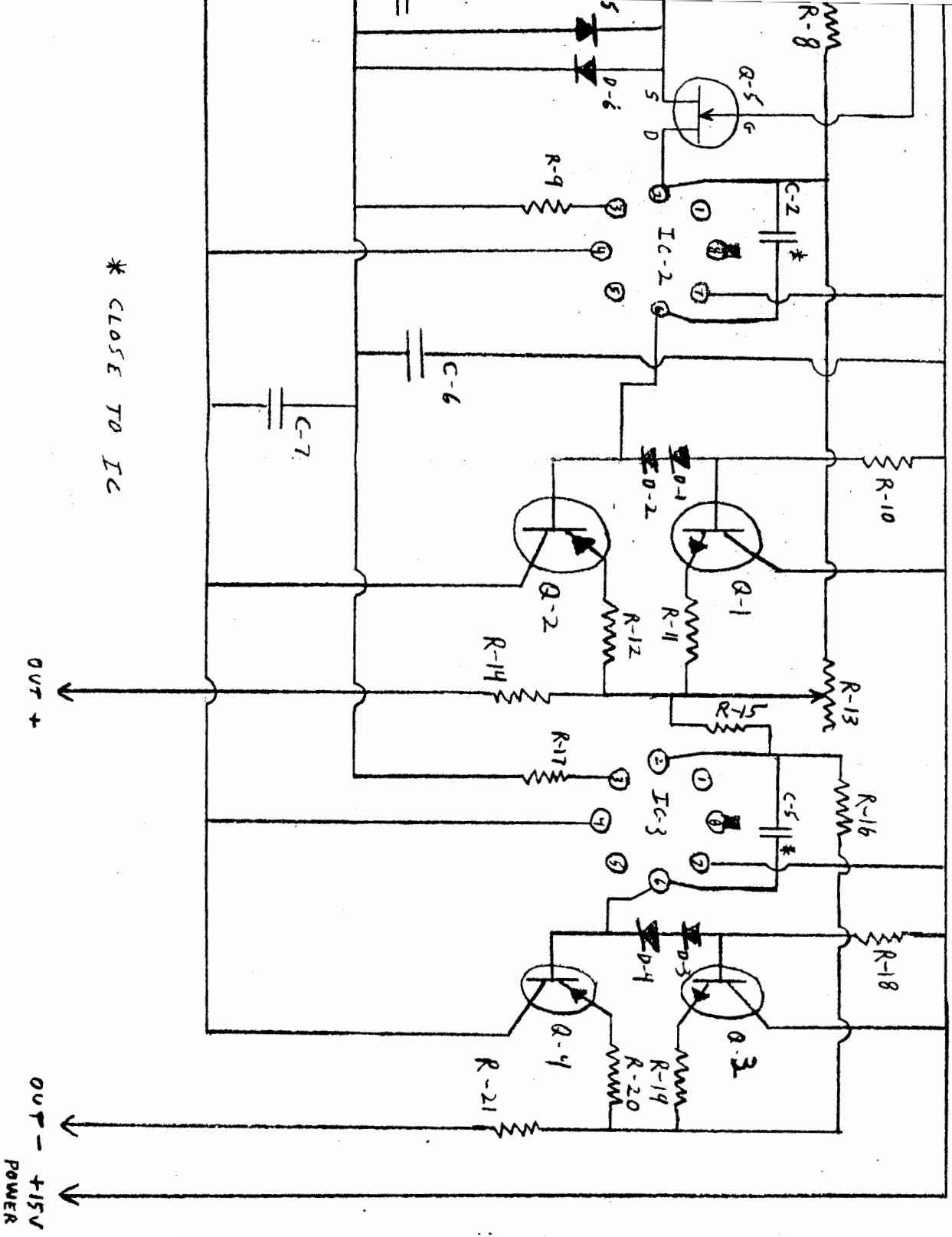
R-31 10K



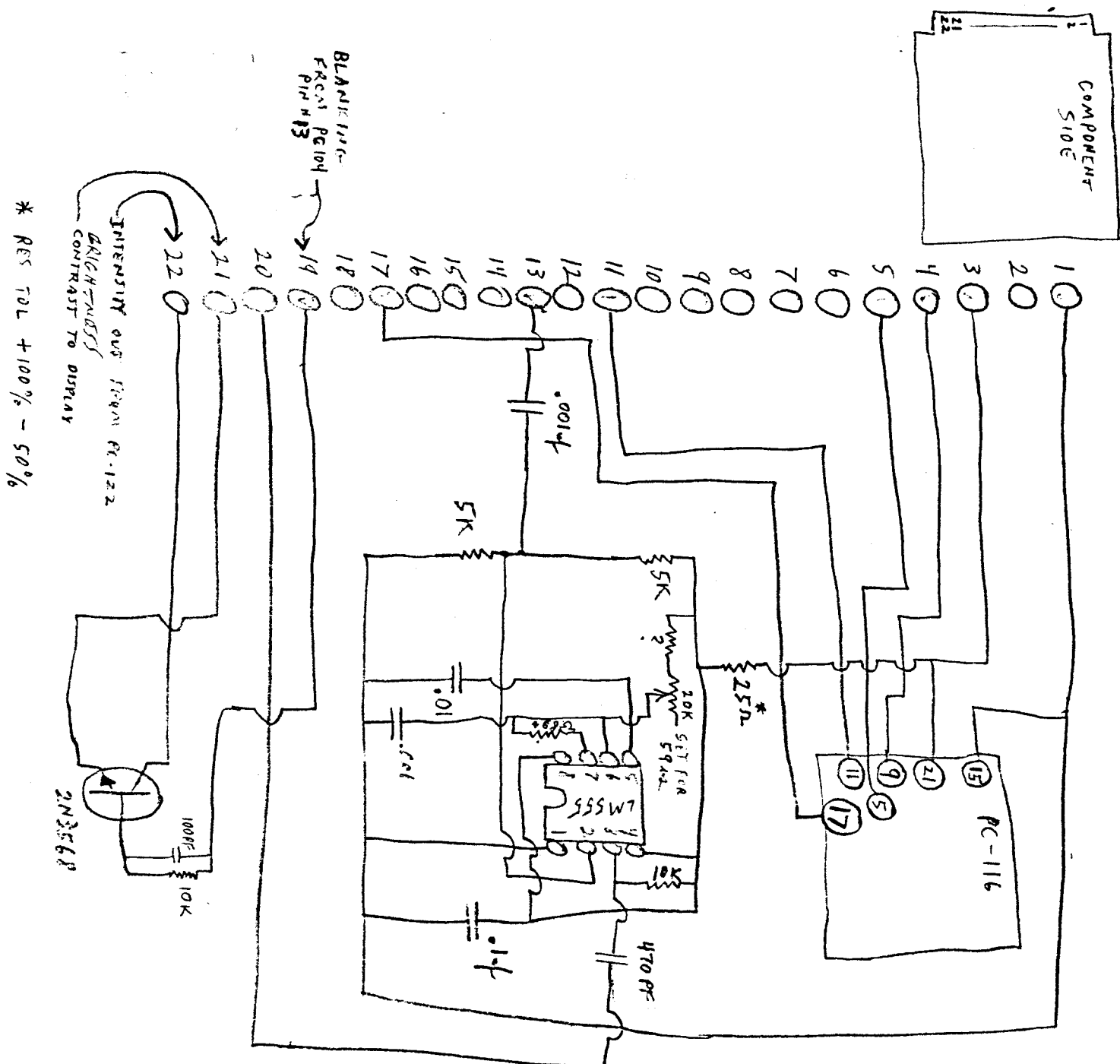




# RUTT ELECTROPHYSICS CORP MODULE MULTIPLIER DEC. 1974







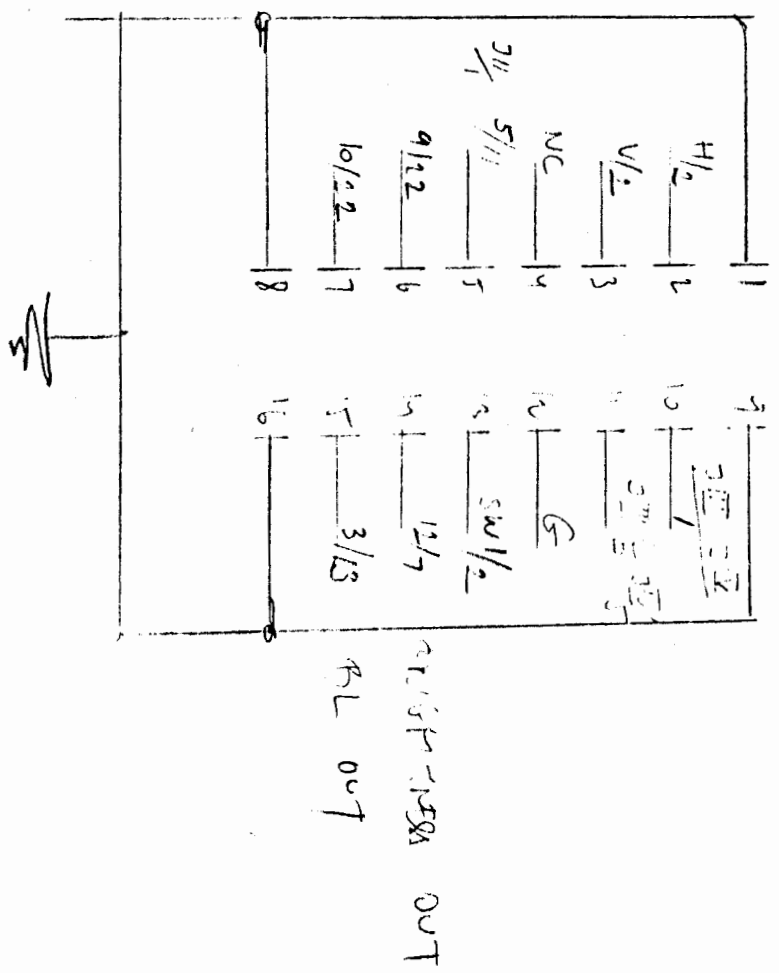




CONTROL UNIT.

J I.

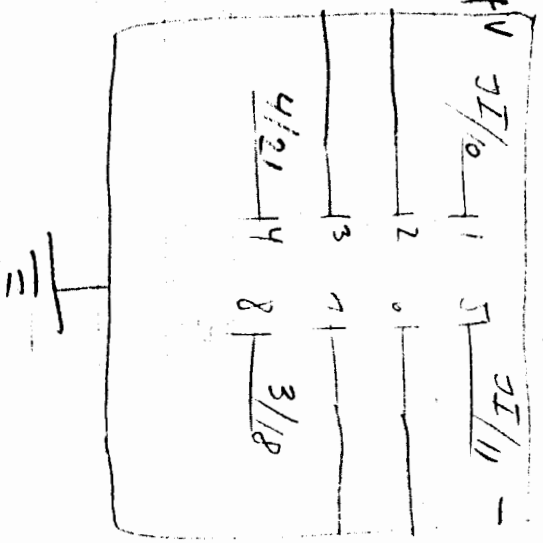
V CONTROL  
V CONTROL



J III / IV

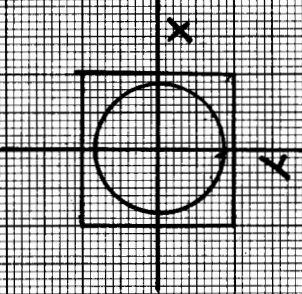
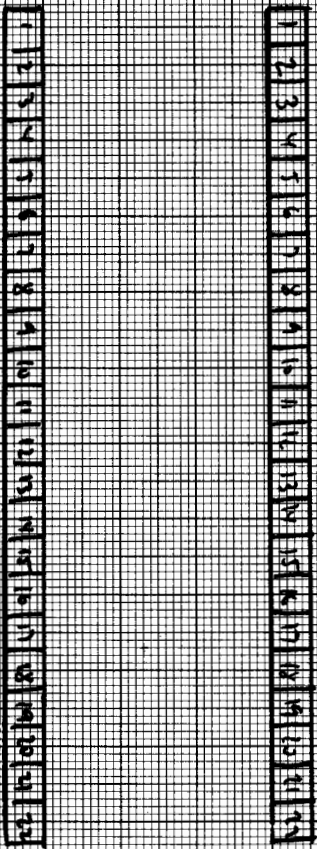
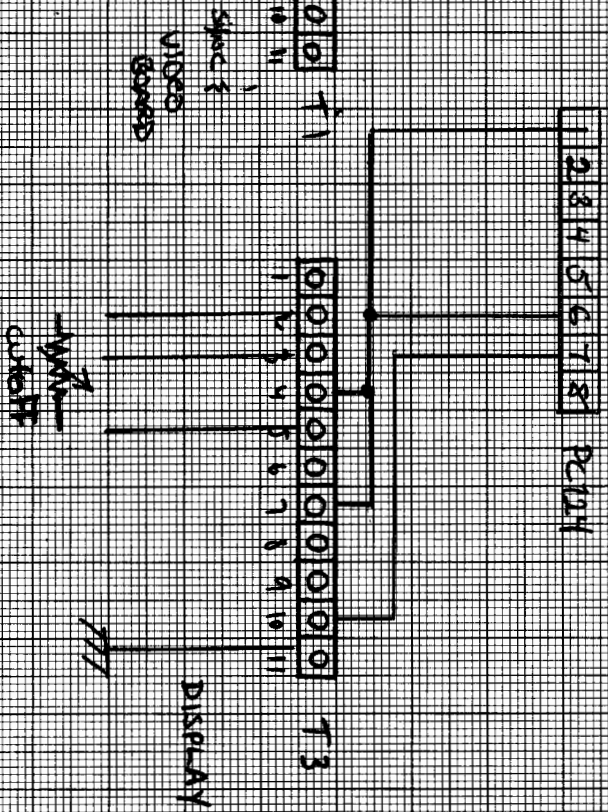
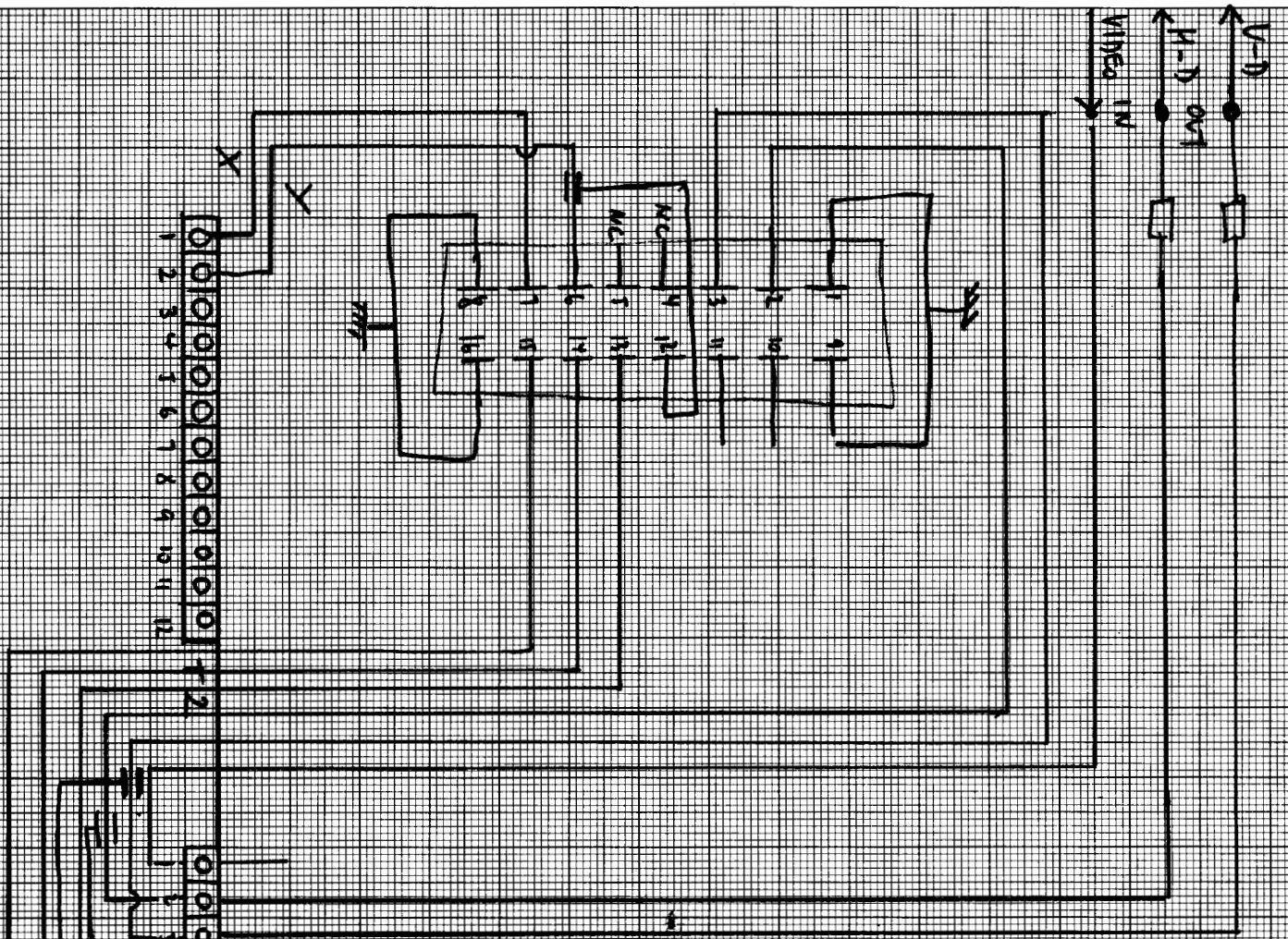
+24V 3I/10 - 24V

H/D

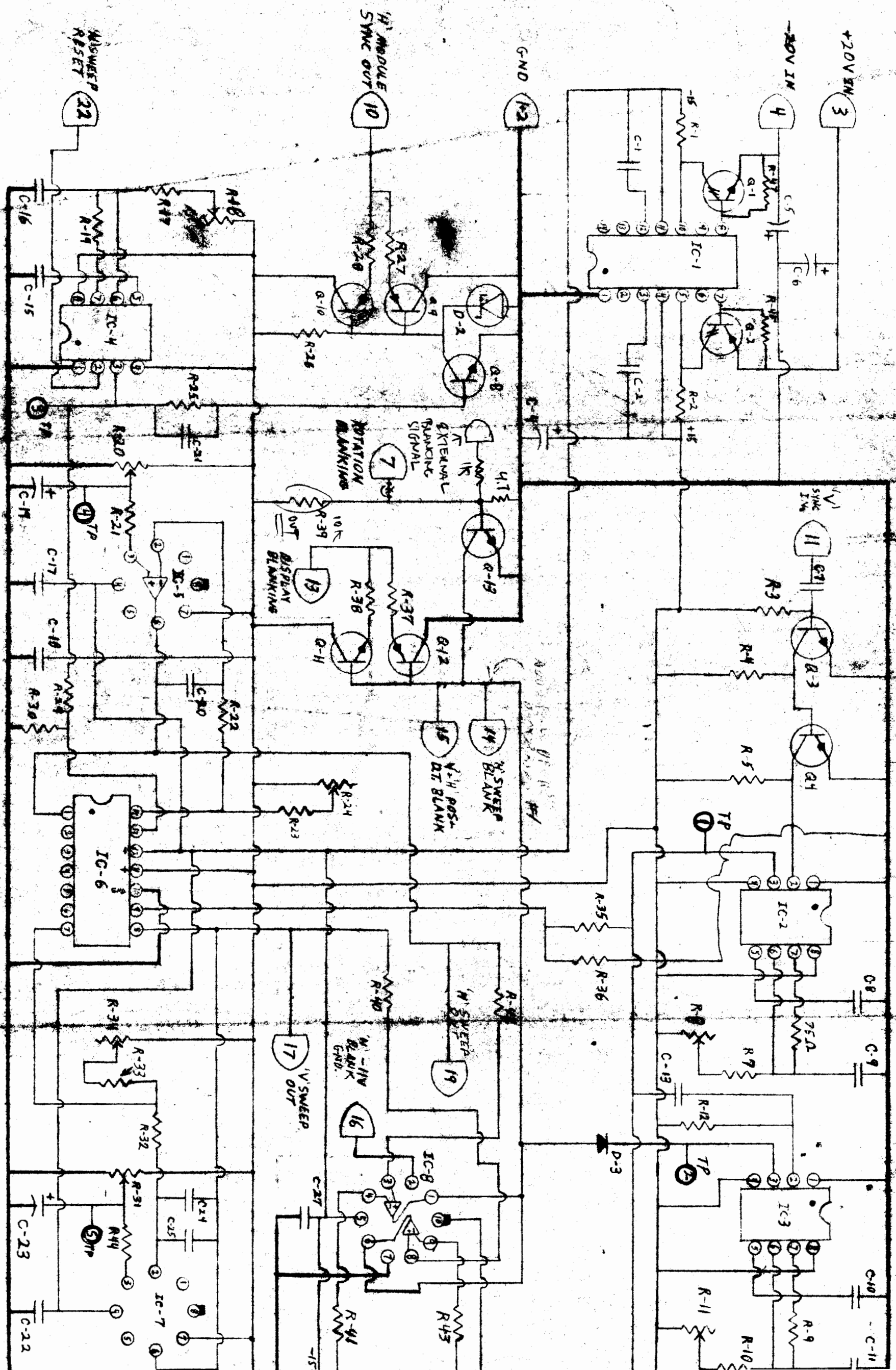




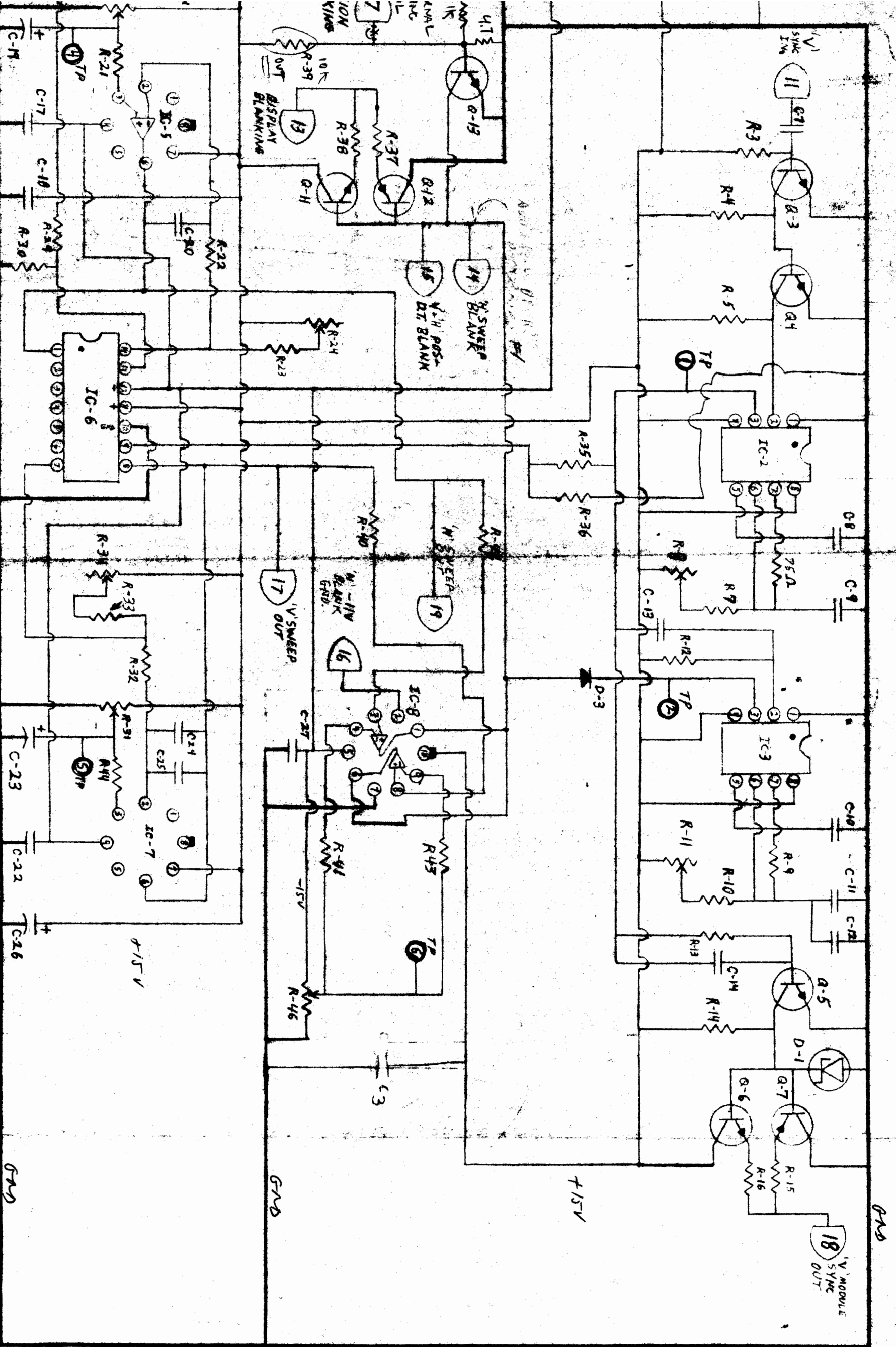
MISC





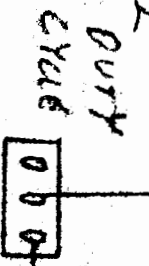




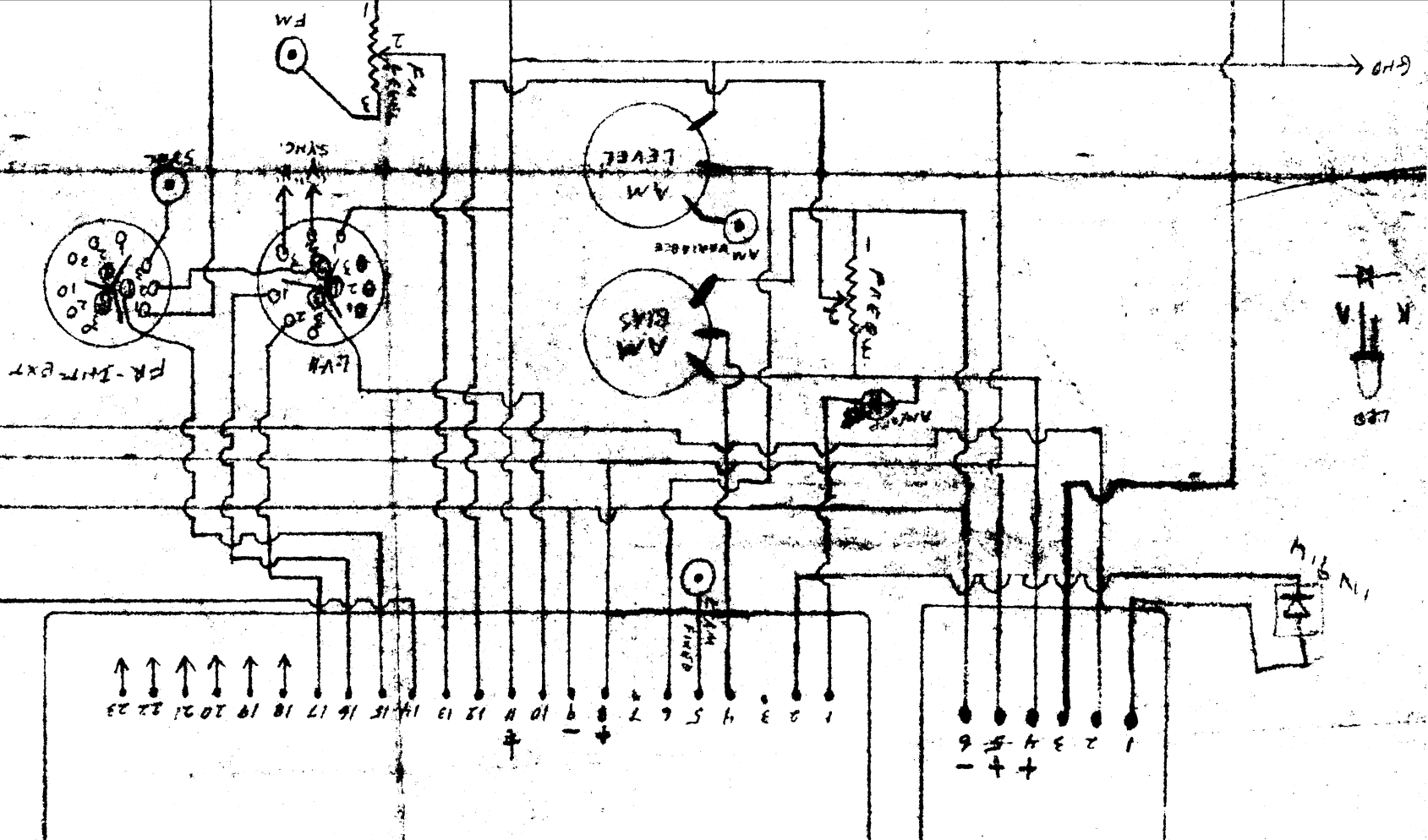


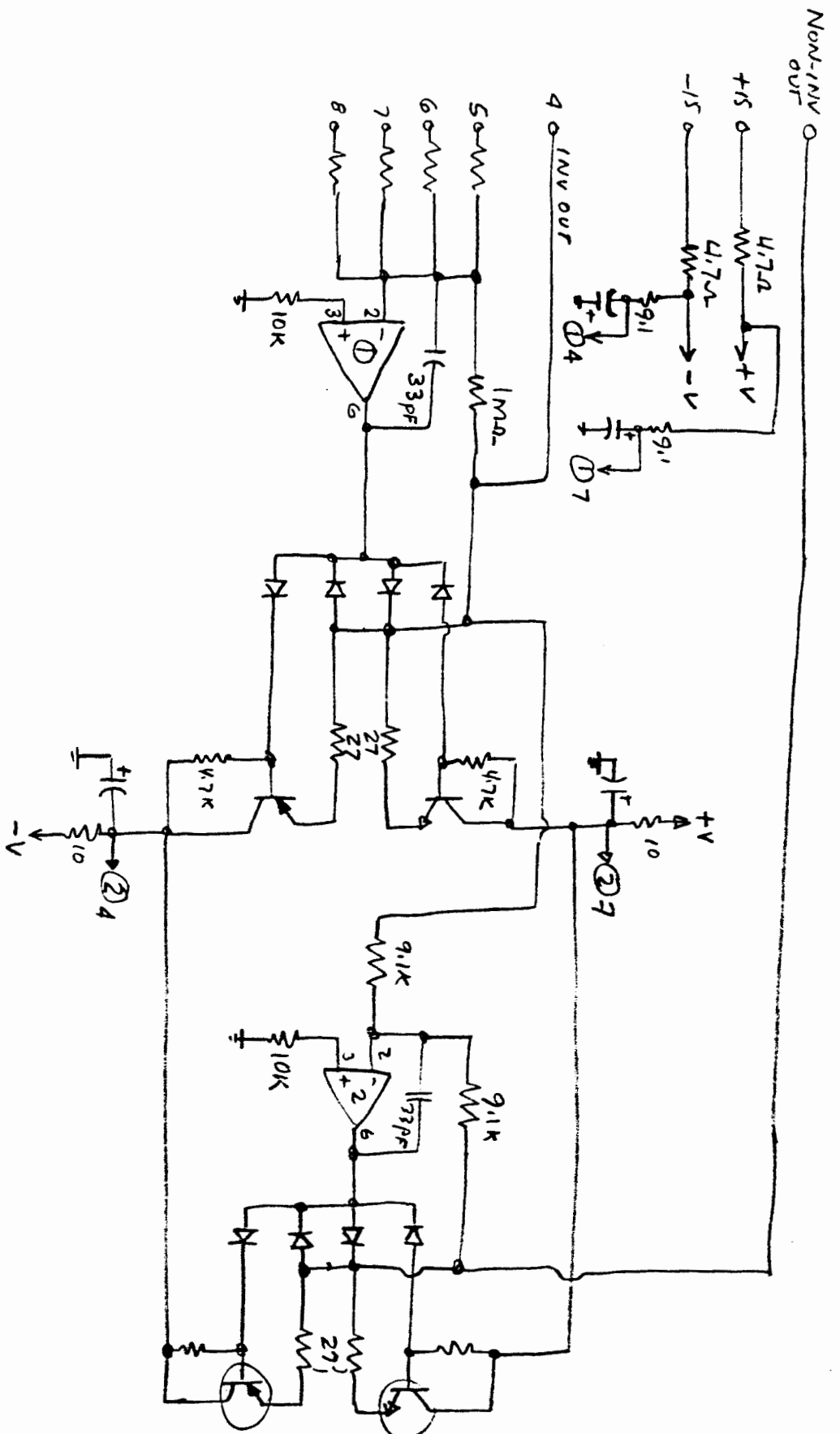
JE K0911/10A  
 FOR QX7  
 PC-104

177









PC-54



IC-10.5

IC-1 LM-319 COMPAREX

IC-2 74LS55

IC-3 74LS55

IC-4 74LS55

IC-5 74LS55

IC-6 LM318 OR AMP - CURRENT SOURCE

IC-7 " " " "

IC-8 74LS55

IC-9 74LS55

Q-1 NPN - 2N3568

Q-2 NPN

Q-3 NPN

Q-4 NPN

Q-5 NPN

Q-6 NPN

Q-7 NPN

Q-8 NPN

Q-9 PNP - 2N3638

Q-10 PNP

Q-11 1N414

Q-12 1N414

Q-13 1N914

Q-14 1N914

Q-15 1N914

Q-16 1N914

Q-17 1N914

Q-18 1N914

Q-19 1N914

Q-20 1N914

Q-21 1N914

Q-22 1N914

Q-23 1N914

Q-24 1N914

Jan 14, 1975  
up to date

REMOVED  
C-3 & C-4  
C-27 10001 TIMING

FOR NOISE SUPPLY: REMOVE C-17  
& ADD 1K in series with pin

NOTE  
ALL TIMING CAPS  
ARE ALYCRINITE  
CERAMIC

4 C-17 27PF 270V (Delete)

4 C-18 1001PF TIMING

4 C-19 1500V 500PF

4 C-20 1000PF TIMING

4 C-21 27PF 270V (Delete)

4 C-22 470PF TIMING

4 C-23 1000PF TIMING

4 C-24 1000PF TIMING

4 C-25 1000PF TIMING

4 C-26 470PF TIMING

4 C-27 1001PF TIMING

4 C-28 1001PF TIMING

R-1 10K

R-2 20K POT (R-9)

R-3 10K

R-4 10K

R-5 1K

R-6 20K POT (R-8)

R-7 10K

R-8 10K

R-9 10K

R-10 10K

R-11 4.7K

R-12 4.7K

R-13 10K

R-14 10K

R-15 75K

R-16 1K

R-17 1K

R-18 20K POT (R-4)

R-19 20K POT (R-5)

R-20 10K

R-21 10K

R-22 10K

R-23 10K

R-24 33K

R-25 10K

R-26 33K

R-27 4.7K

R-28 4.7K

R-29 75K

R-30 100K

R-31 10K

R-32 10K

R-33 1K

R-34 10K

R-35 10K

R-36 20K POT (R-1)

R-37 10K

R-38 10K

R-39 20K POT (R-2)

R-40 10K

R-41 10K

R-42 20K POT (R-3)

R-43 10K

R-44 10K

R-45 10K

R-46 10K

R-47 1K

R-48 10K

R-49 10K

R-50 1K

R-51 20K POT (R-4)

R-52 10K

R-53 20K POT (R-5)

R-54 1K

R-55 10K

R-56 10K

R-57 10K

R-58 10K

R-59 10K

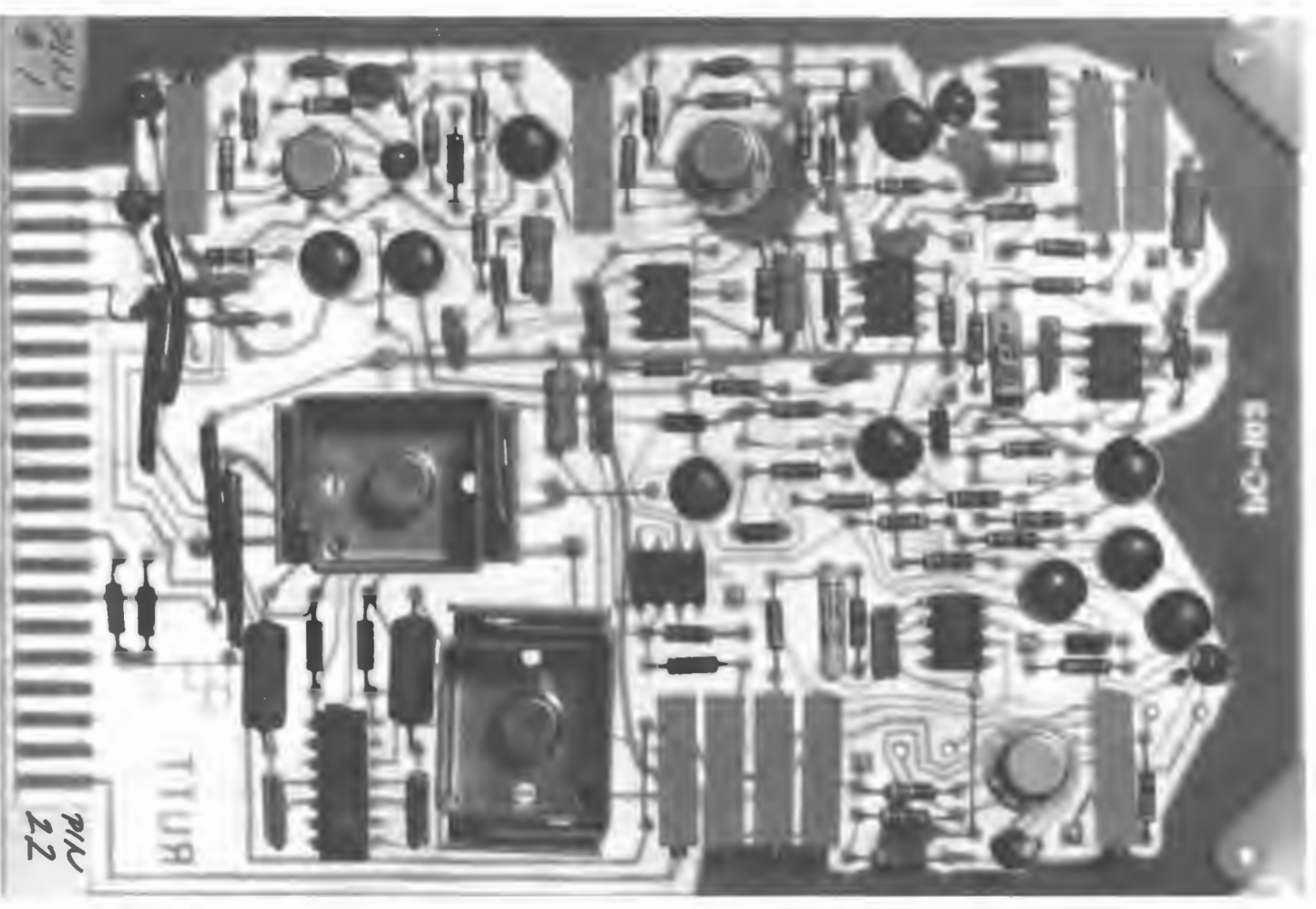
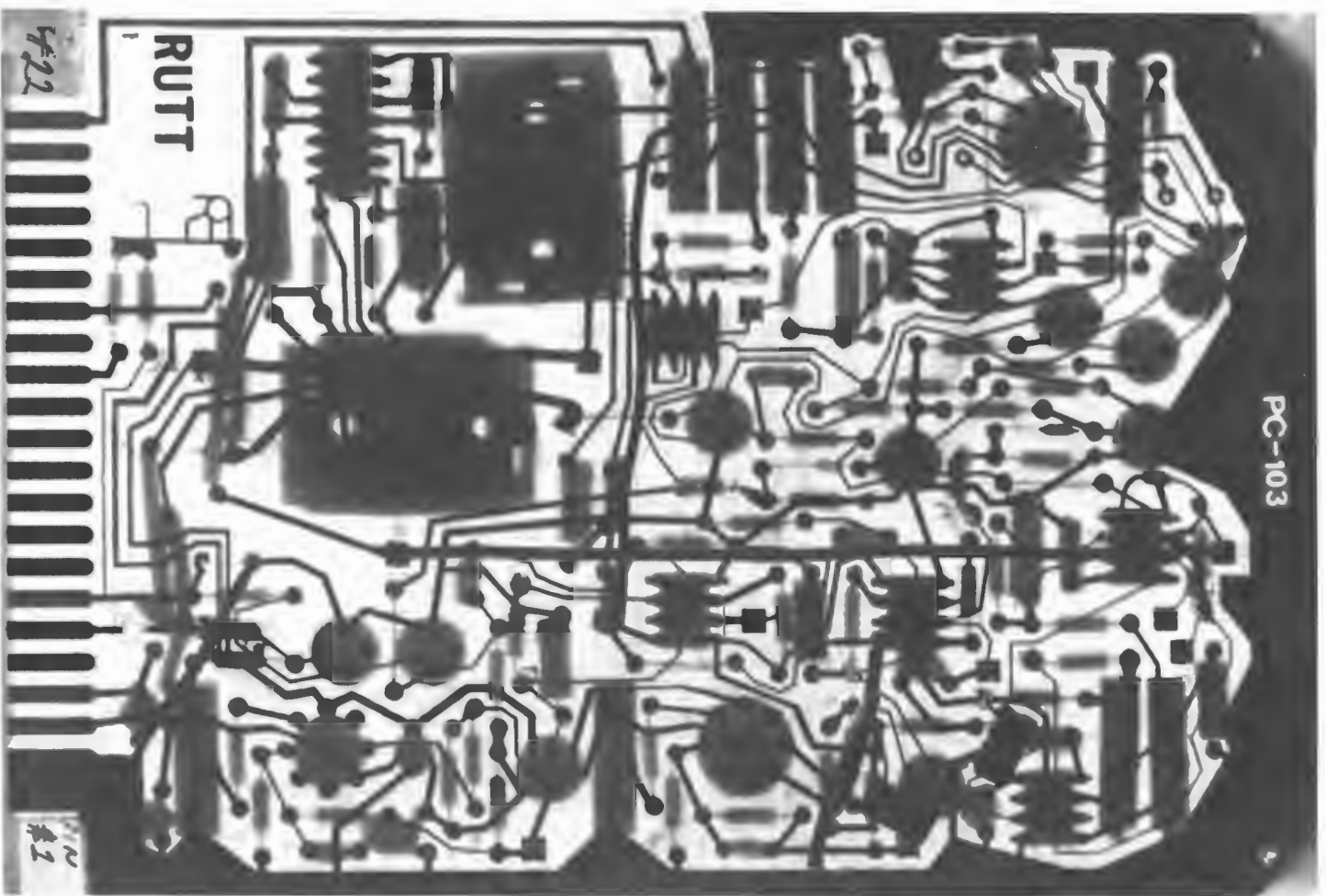
R-60 10K

R-61 1K

R-62 10K

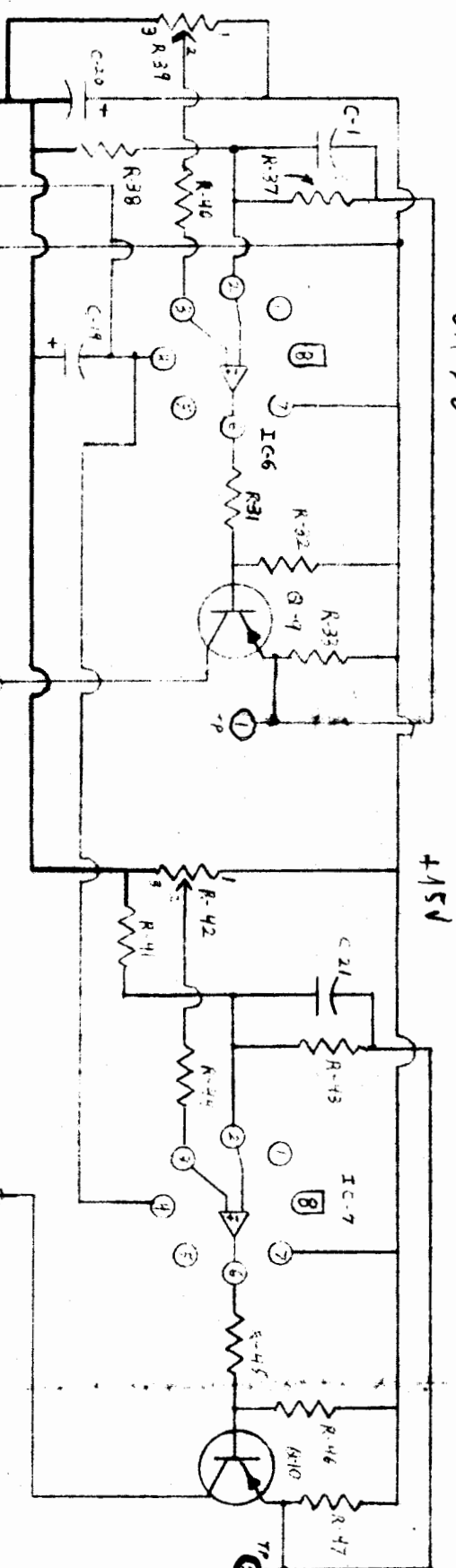
HC5  
67

PC 103

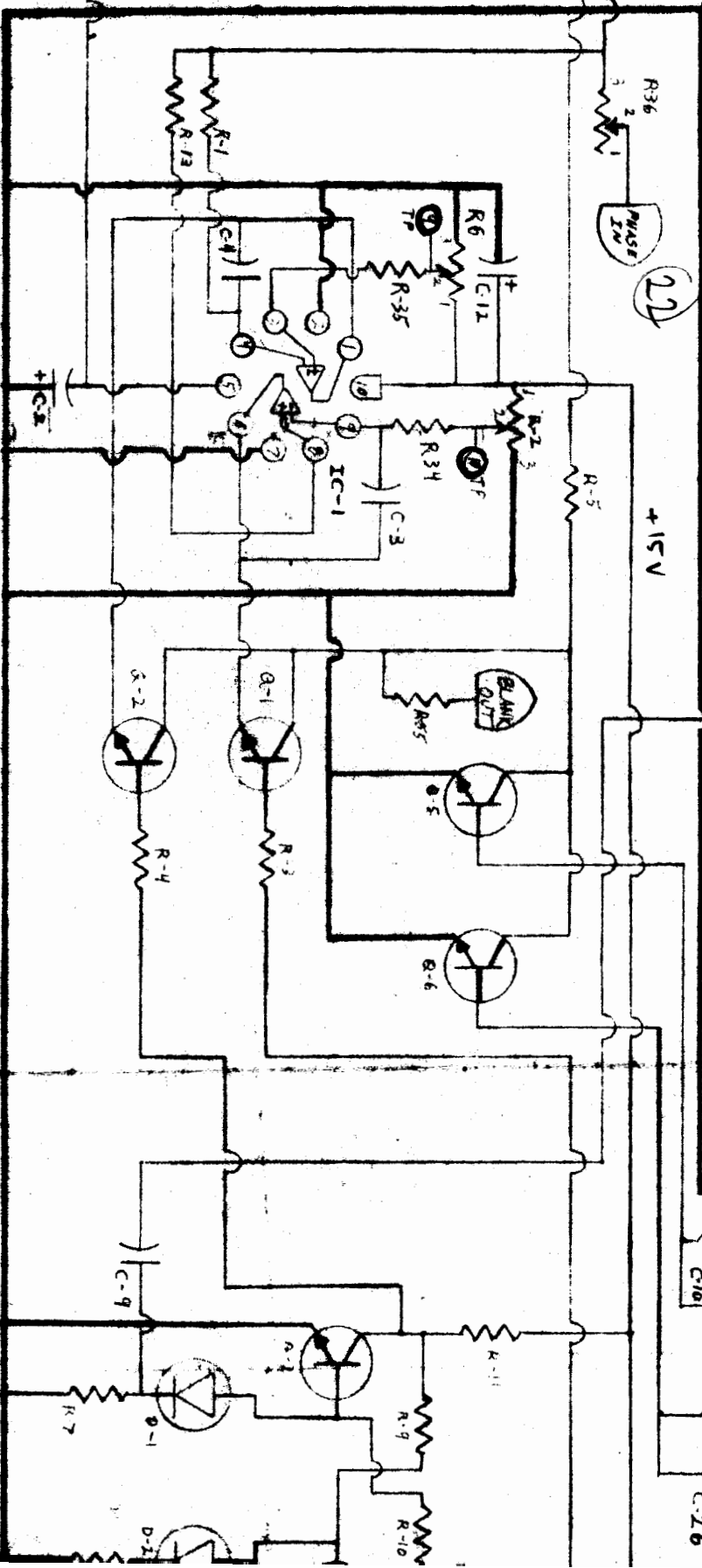
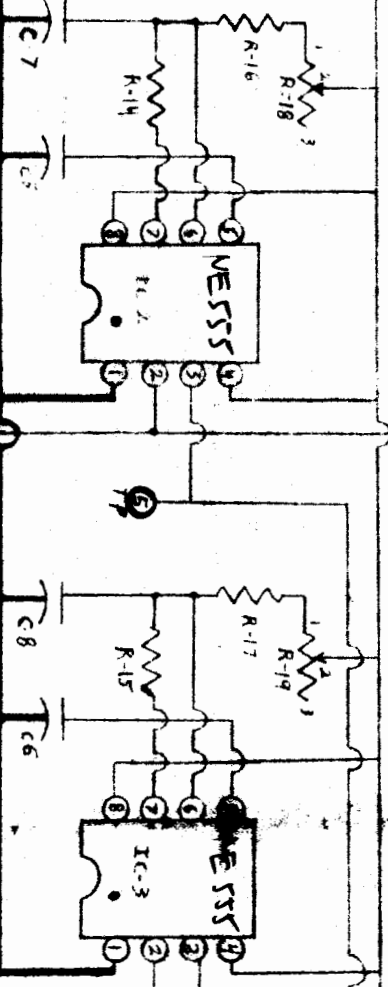
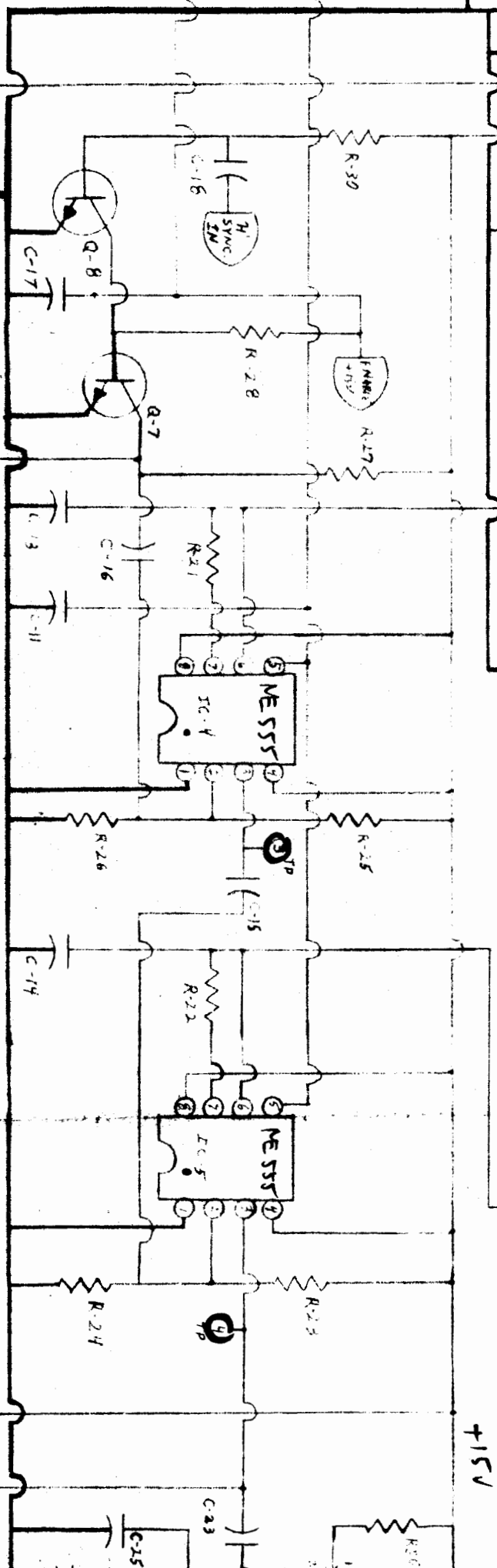




CURRENT SOURCE  
LM 318



LM 318



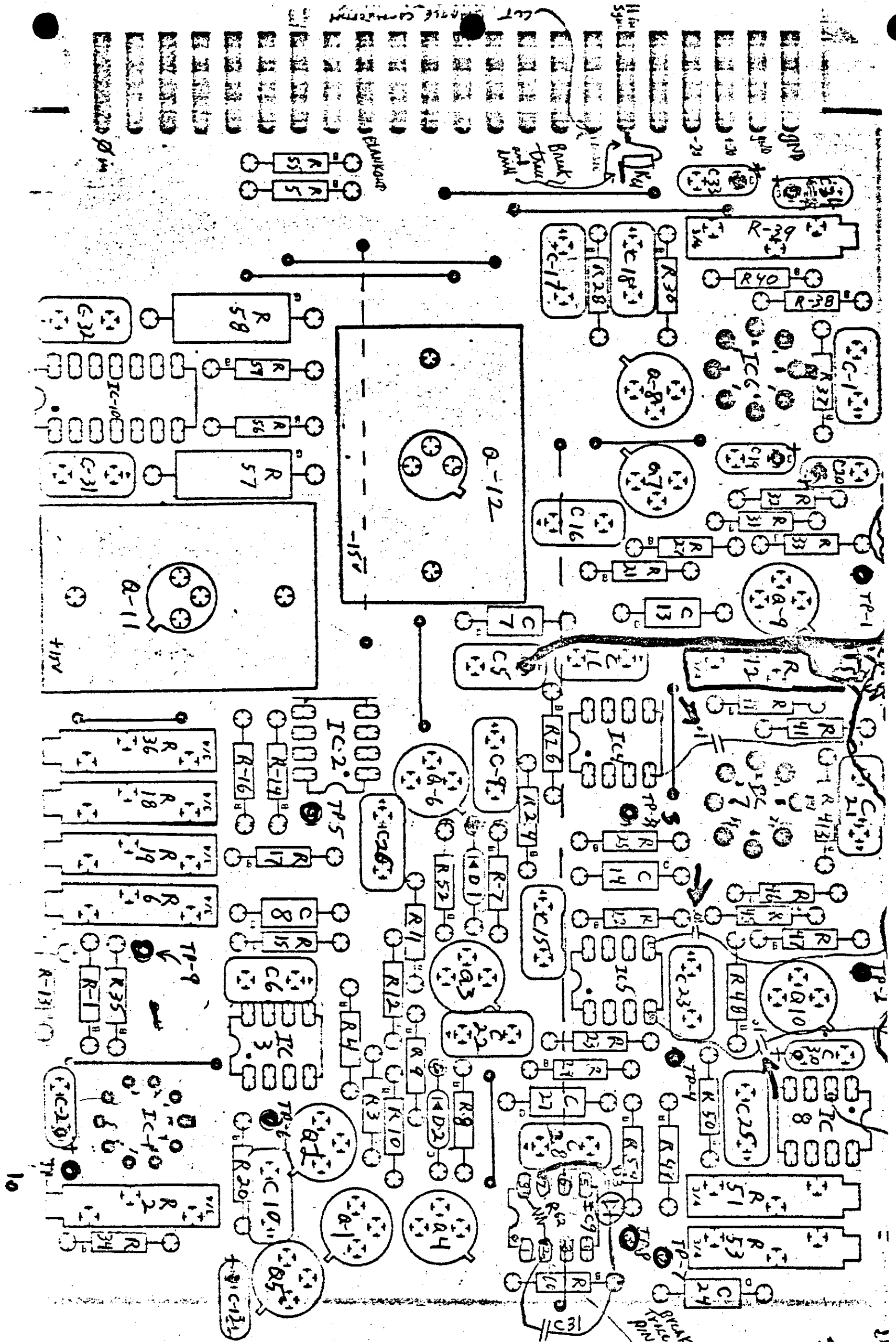
LM 310  
COMPARATOR



3/21/74

NOV 11  
Knox  
A. J. M.  
George F. M.  
M. R. S.  
L. H.

103



PC-103

Break  
 trace at pin  
 IC9. Attache  
 10K (R12) from f  
 8L pin 2. D10  
 (D3) from pin 7 & 4  
 no sketch. C31  
 goes from pin 2. 1  
 R10 (w/ 100K D10)



# PC-104 V+H SWEEP + BLANKING OUTPUT

INPUTS

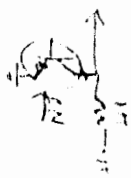
FROM

ROT. BLANK

UN-BLANK

BLANK BLANKING IS FORMERLY  
ADJUSTED AS ACCURATELY  
AS POSSIBLE.

H SWEEP BLANK  
(FROM B.H. SWEEP ST.  
LEFT-MOST POINT)



BLANKING IS FORMERLY  
ADJUSTED AS ACCURATELY  
AS POSSIBLE.

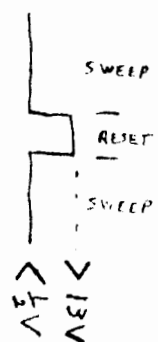
V POS.

OUT-TRACE



BLANKING IS FORMERLY  
ADJUSTED AS ACCURATELY  
AS POSSIBLE.

H SWEEP RESET

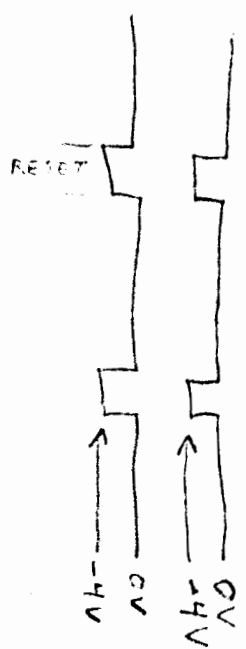


FROM B.H. SWEEP ST.  
LEFT-MOST POINT  
PC-104

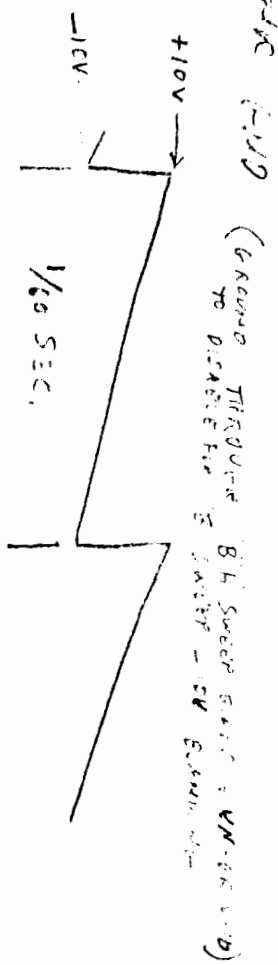
OUTPUTS  
TO

V MODULE SYNC

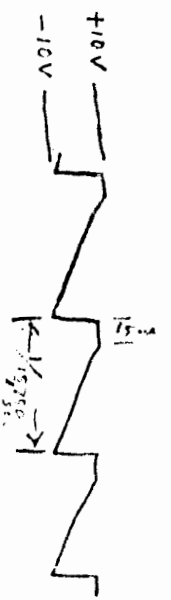
H MODULE SYNC



H -10V BLANK END  
V SWEEP



H SWEEP

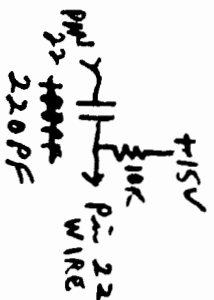


DISPLAY BLANKING <1V  
(TO DISPLAY)

+100mA  
-20 mA

PC-104

IC-1 SG-4501  
IC-2 555 V' RESET TIME  
IC-3 555 V' UN-BLANK  
IC-4 555 H' RESET TIME  
IC-5 LM318 H' INTEGRATOR  
IC-6 AH013CD on AH0134CD RESET SWITCH  
IC-7 LM318 V' INTEGRATOR  
IC-8 LM318 COMPACTOR SWEEP-11V BLANK  
Q-1 NPN 40409 -D-1 5V ZENERS  
Q-2 PNP 40410 -D-2 5V ZENERS  
Q-3 NPN - 2N3565 -D-3 1N914  
Q-4 NPN -  
Q-5 NPN -  
Q-6 NPN -  
Q-7 PNP  
Q-8 NPN -  
Q-9 PNP  
Q-10 NPN -  
Q-11 NPN -  
Q-12 PNP  
Q-13 NPN -

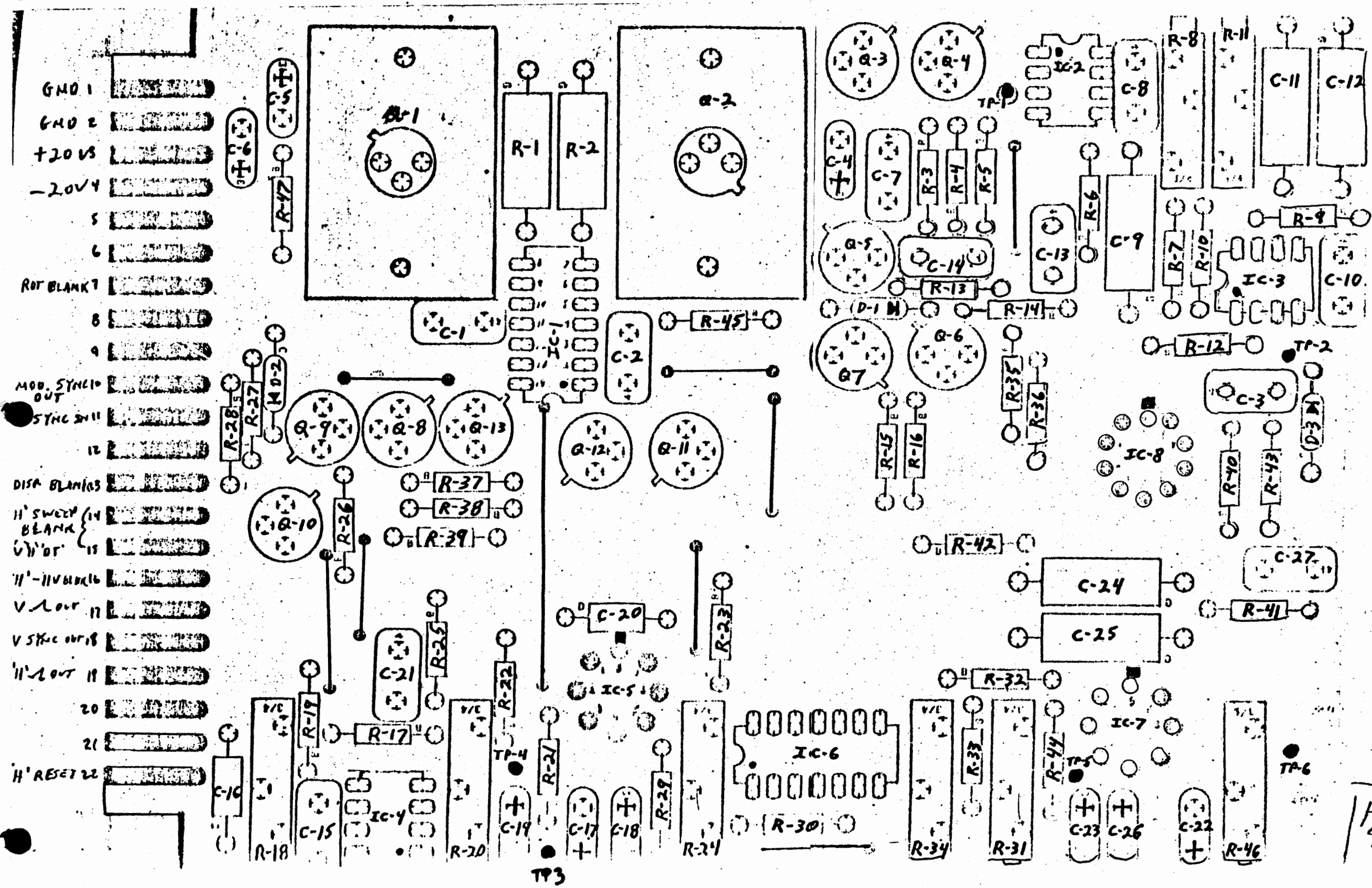


C-1 .1 CER ✓ RA1 .52 500K  
C-2 .1 CER ✓ RA2 .52 500K  
C-3 .14 CER ✓ RA3 100K  
C-4 154 20V TANT ✓ RA4 4.7K  
C-5 25.4 73V TANT ✓ RA5 4.7K  
C-6 154 20V TANT ✓ RA6 75Ω  
C-7 220PF CER ✓ RA7 1K -  
C-8 .14 CER ✓ RA8 20K POT  
C-9 .14 MYL ✓ RA9 75Ω  
C-10 .1 CER ✓ RA10 33K -  
C-11 .1 MYL ✓ RA11 100K POT  
C-12 .1 MYL ✓ RA12 10K -  
C-13 100PF CER ✓ RA13 10K -  
C-14 100PF CER ✓ RA14 2.2K -  
C-15 .14 CER ✓ RA15 10Ω -  
C-16 .001 MYL ✓ RA16 10Ω -  
C-17 154 20V ✓ RA17 1K -  
C-18 154 20V ✓ RA18 20K 100Ω  
C-19 154 20V TANT ✓ RA19 75Ω -  
C-20 .0614 MYL ✓ RA20 20K POT  
C-21 100PF CER ✓ RA21 20K -  
C-22 154 20V TANT ✓ RA22 1K 20K  
C-23 154 20V TANT ✓ RA23 47K -  
C-24 .14 MYL ✓ RA24 20K POT  
C-25 .14 MYL ✓ RA25 10K -  
C-26 154 20V TANT ✓ RA26 2.2K -  
C-27 .14 CER ✓ RA27 10Ω  
RA28 10Ω  
RA29 2.7K -  
RA30 1K -  
RA31 20K  
RA32 20K POT  
RA33 10K -  
RA34 20K POT  
RA35 2.7K -  
RA36 1K -  
RA37 270Ω  
RA38 270Ω  
RA39 10K  
RA40 10K  
RA41 10K  
RA42 10K  
RA43 10K  
RA44 10K  
RA45 10K  
RA46 10K  
RA47 10K  
RA48 10K  
RA49 10K  
RA50 10K  
RA51 10K  
RA52 10K  
RA53 10K  
RA54 10K  
RA55 10K  
RA56 10K  
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RA62 10K  
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RA67 10K  
RA68 10K  
RA69 10K  
RA70 10K  
RA71 10K  
RA72 10K  
RA73 10K  
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RA75 10K  
RA76 10K  
RA77 10K  
RA78 10K  
RA79 10K  
RA80 10K  
RA81 10K  
RA82 10K  
RA83 10K  
RA84 10K  
RA85 10K  
RA86 10K  
RA87 10K  
RA88 10K  
RA89 10K  
RA90 10K  
RA91 10K  
RA92 10K  
RA93 10K  
RA94 10K  
RA95 10K  
RA96 10K  
RA97 10K  
RA98 10K  
RA99 10K  
RA100 10K

R8 V' RESET - SET TP-1 FOR 1250mV POSITIVE PULSE WIDTH  
R-11 V' UN-BLANK - SET TP-2 FOR 15.5mV POSITIVE PULSE WIDTH  
R-18 H' RESET - SET TP-3 FOR 15mV POSITIVE PULSE WIDTH  
R-20 H' SWEEP RESET VOLTAGE - SET TP-4 FOR +10V  
R-21 H' SWEEP ΔV/ΔT  
R-31 V' SWEEP RESET VOLTAGE - SET TP-5 FOR +10V  
R-31 V' SWEEP ΔV/ΔT  
R-46

-11V SWEEP BLANK - SET TP-6 TO -11V

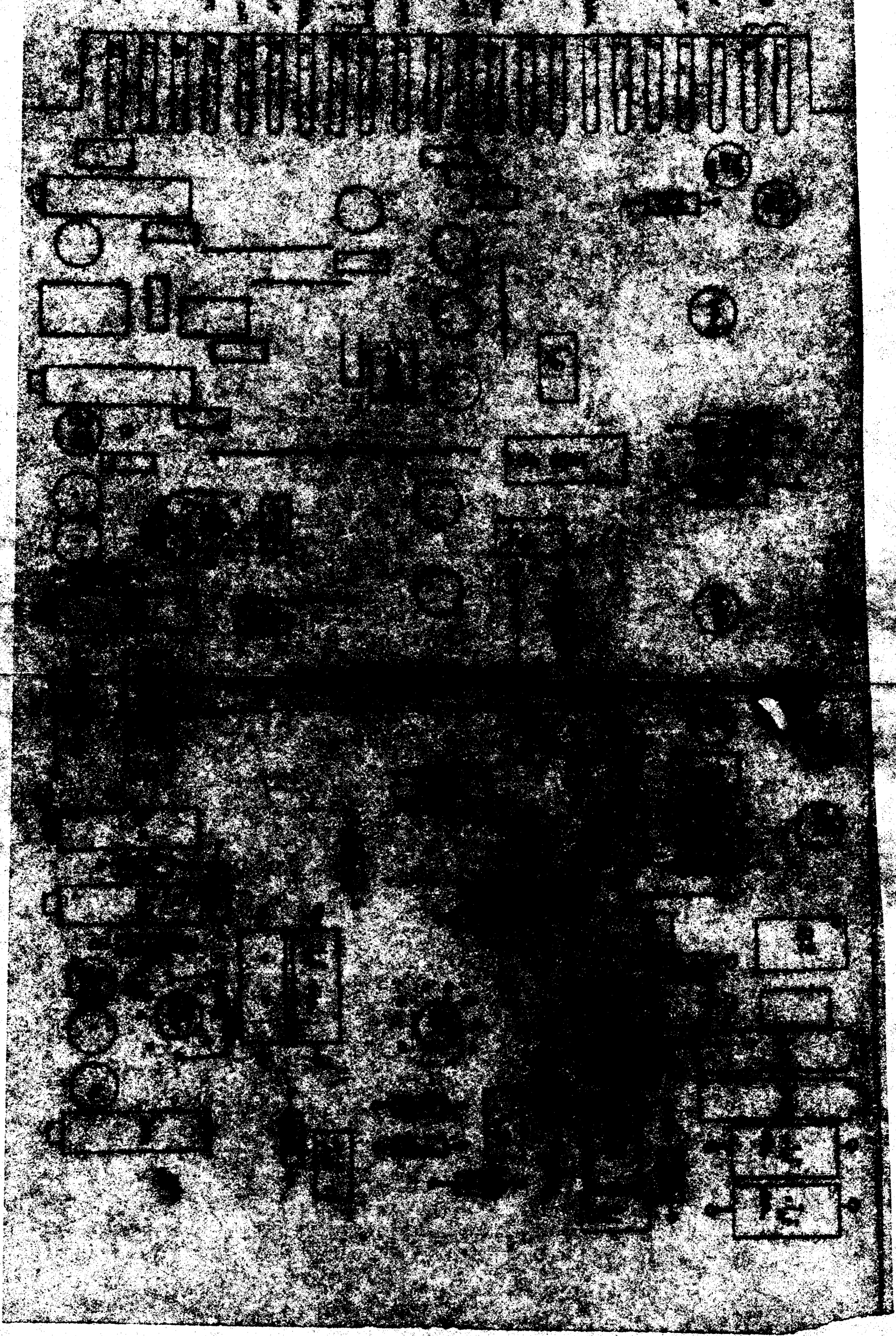
CCX - CERNIC  
TAN - TANTANUM  
WCS



HC-104

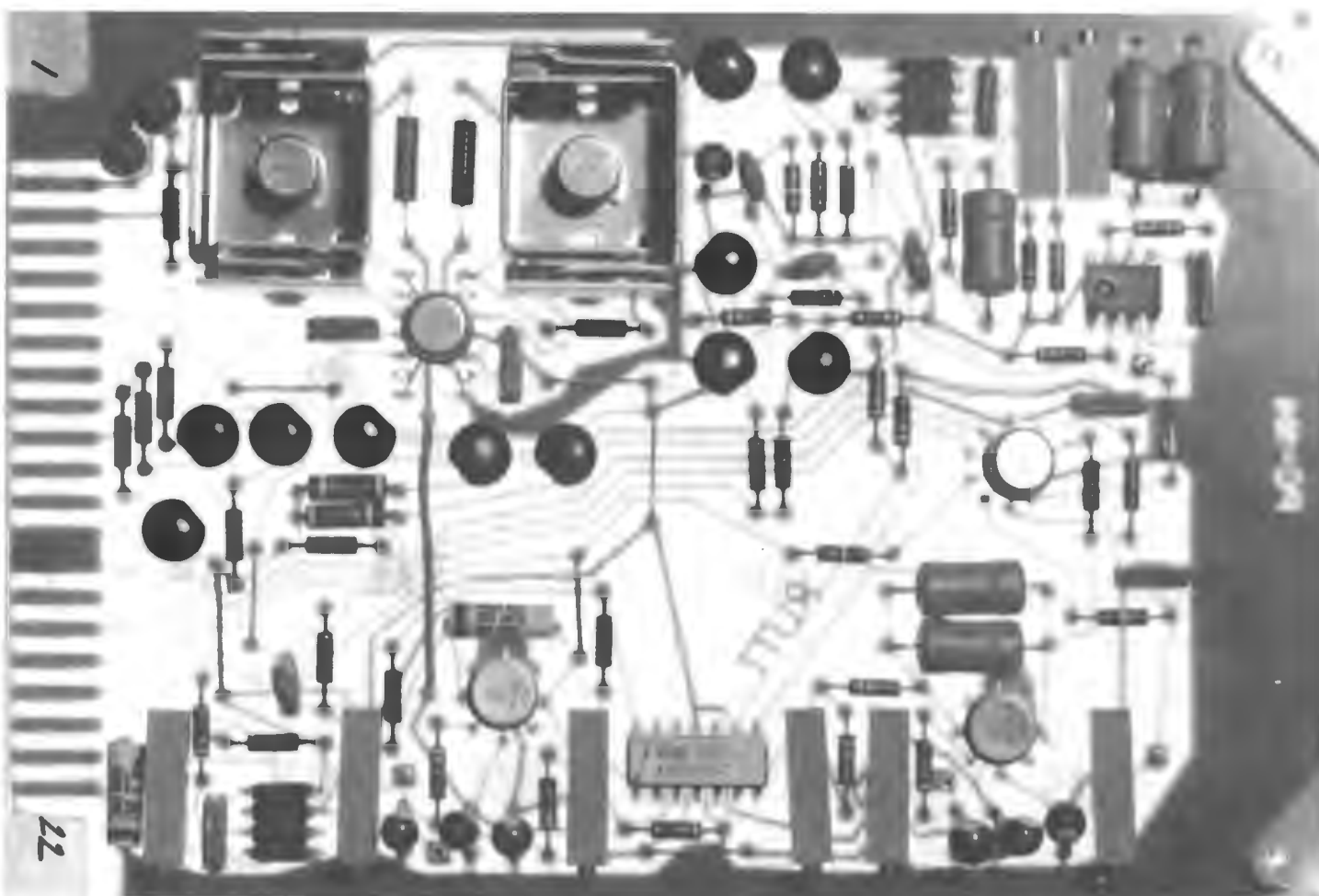
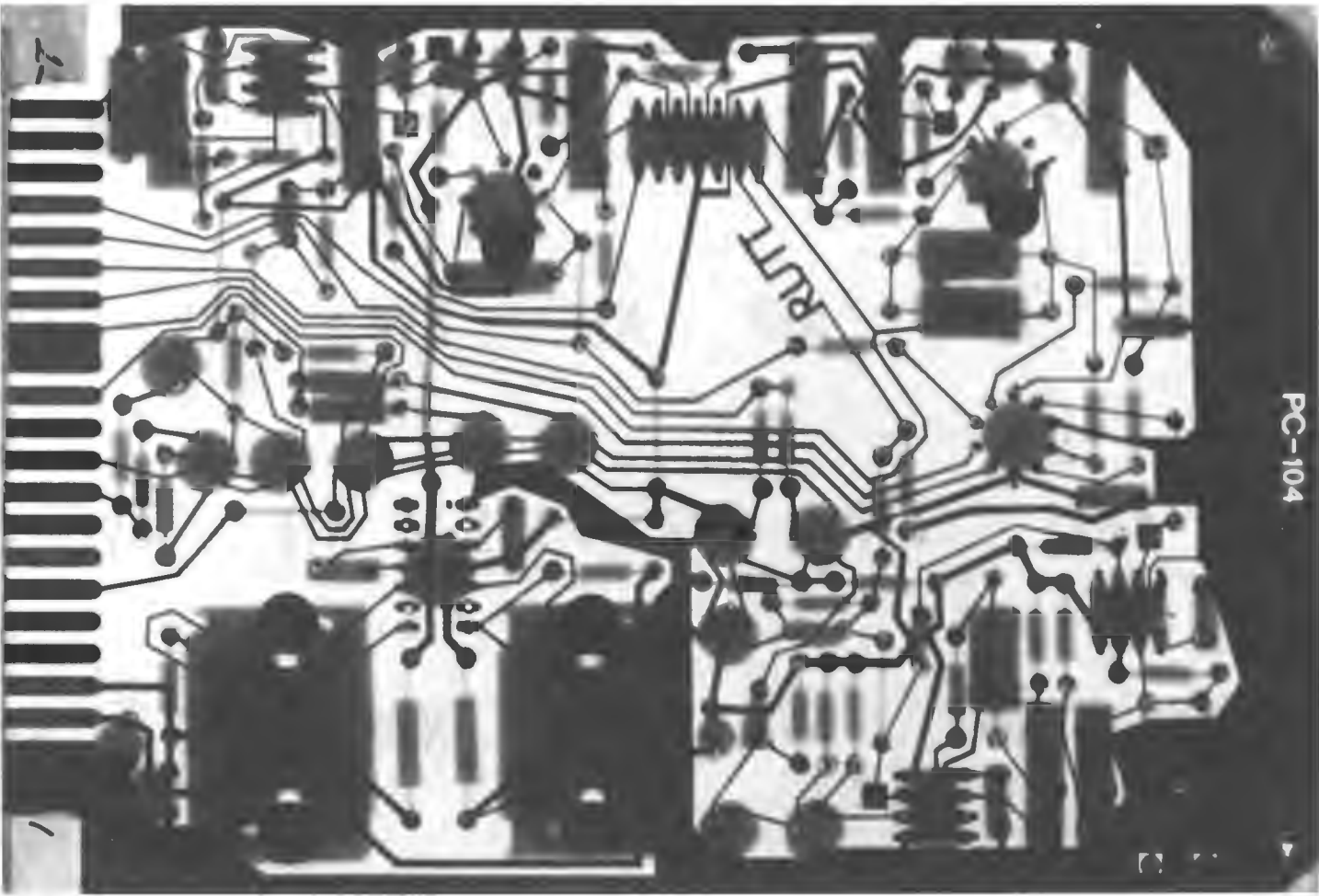
HC.S  
42



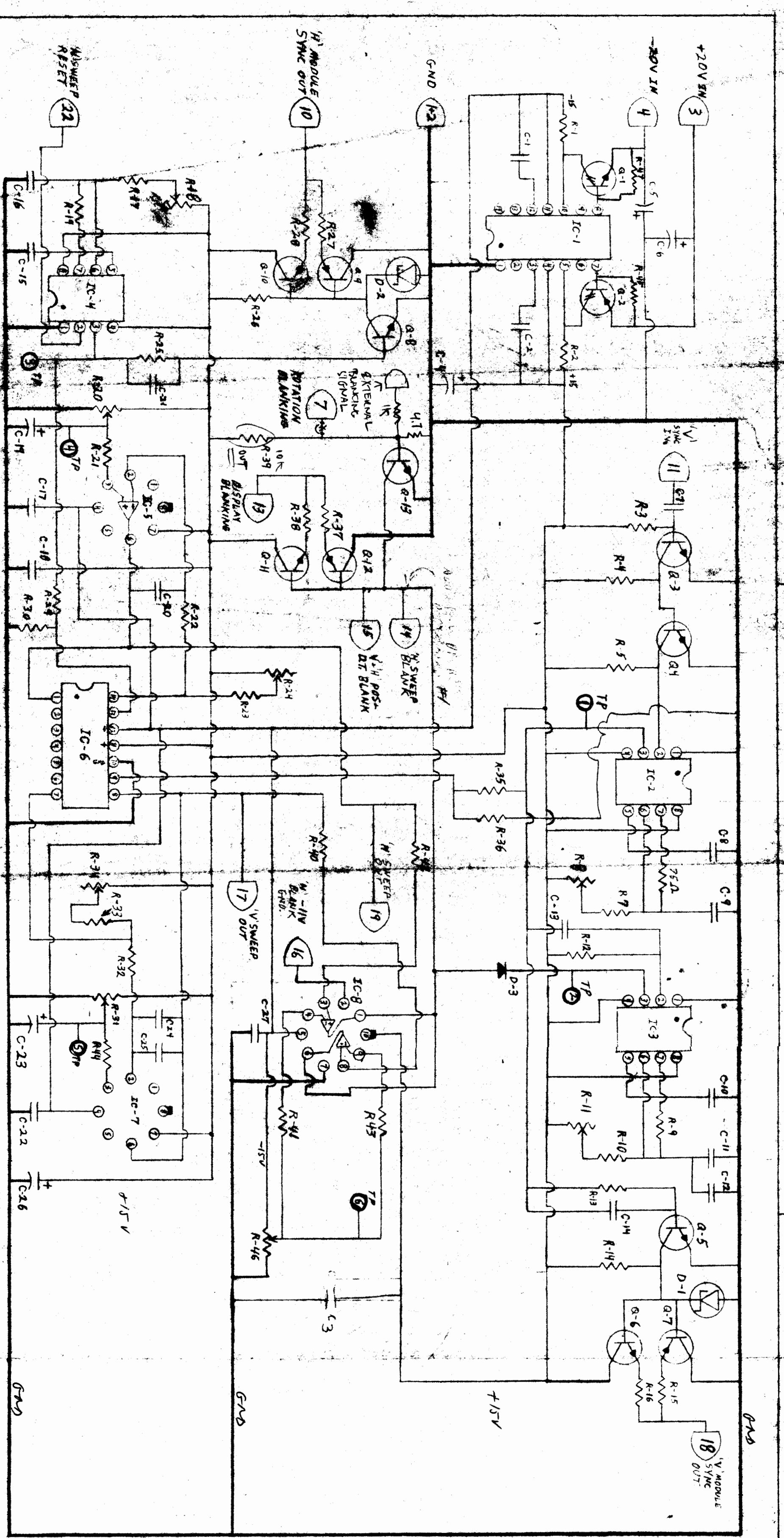












PC-104

JE MAGNIFIC

FOOL GAT 1

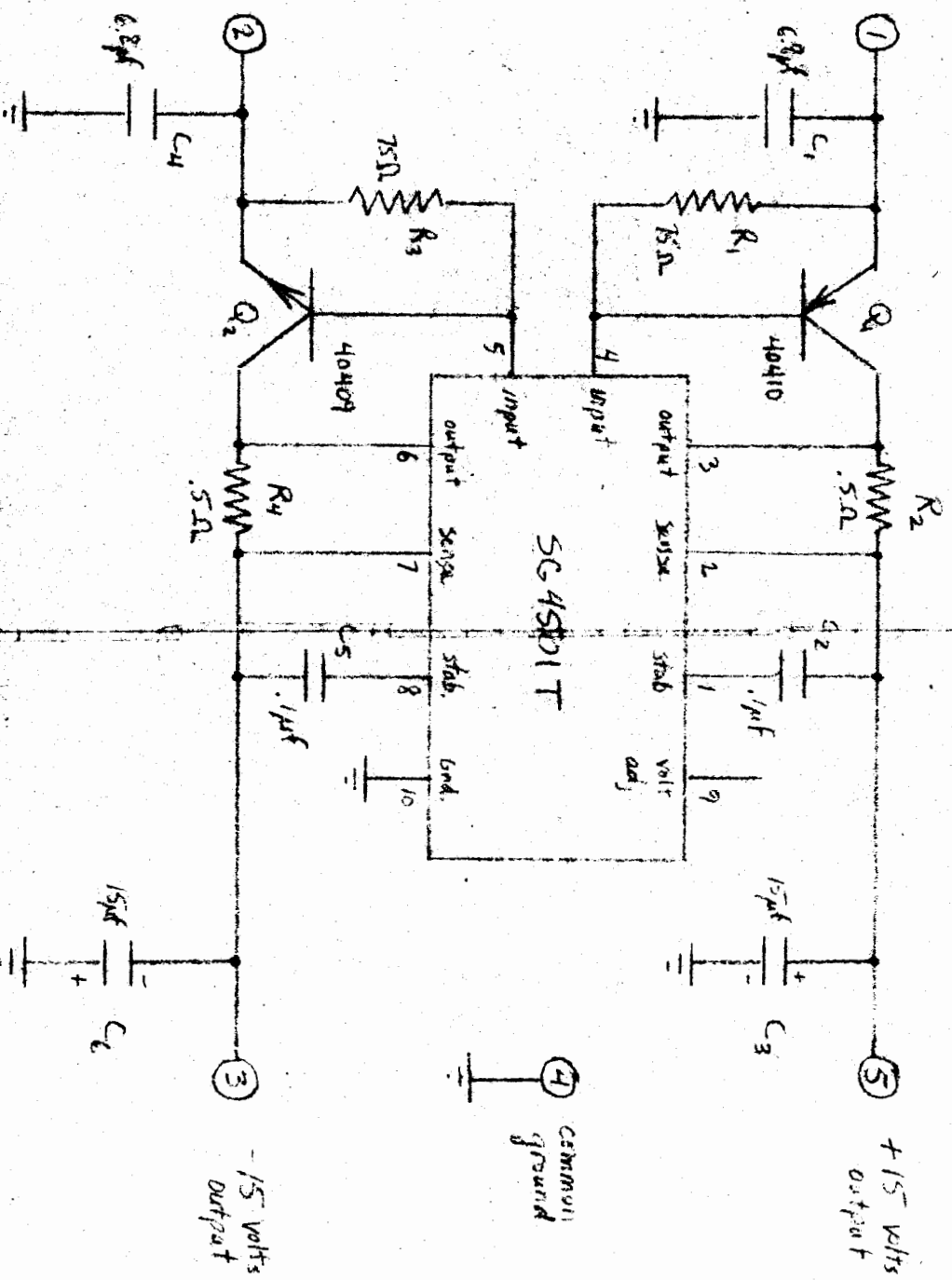


PC 105

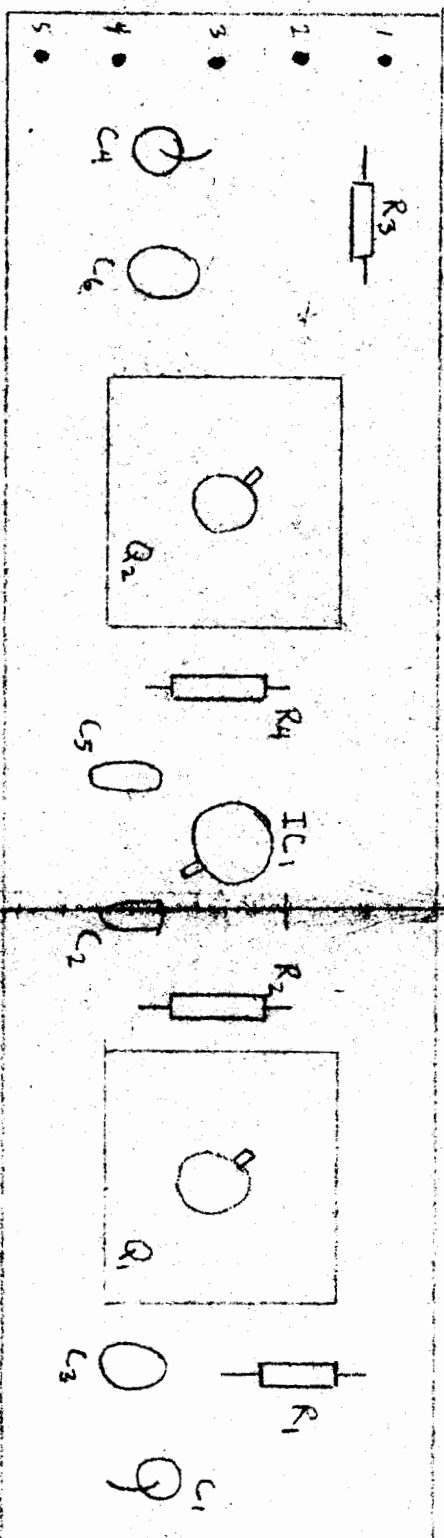
± 15V REGULATED

POWER SUPPLY BOARD

(C. JAMES)



Top View



PC 105 -  
Power supply

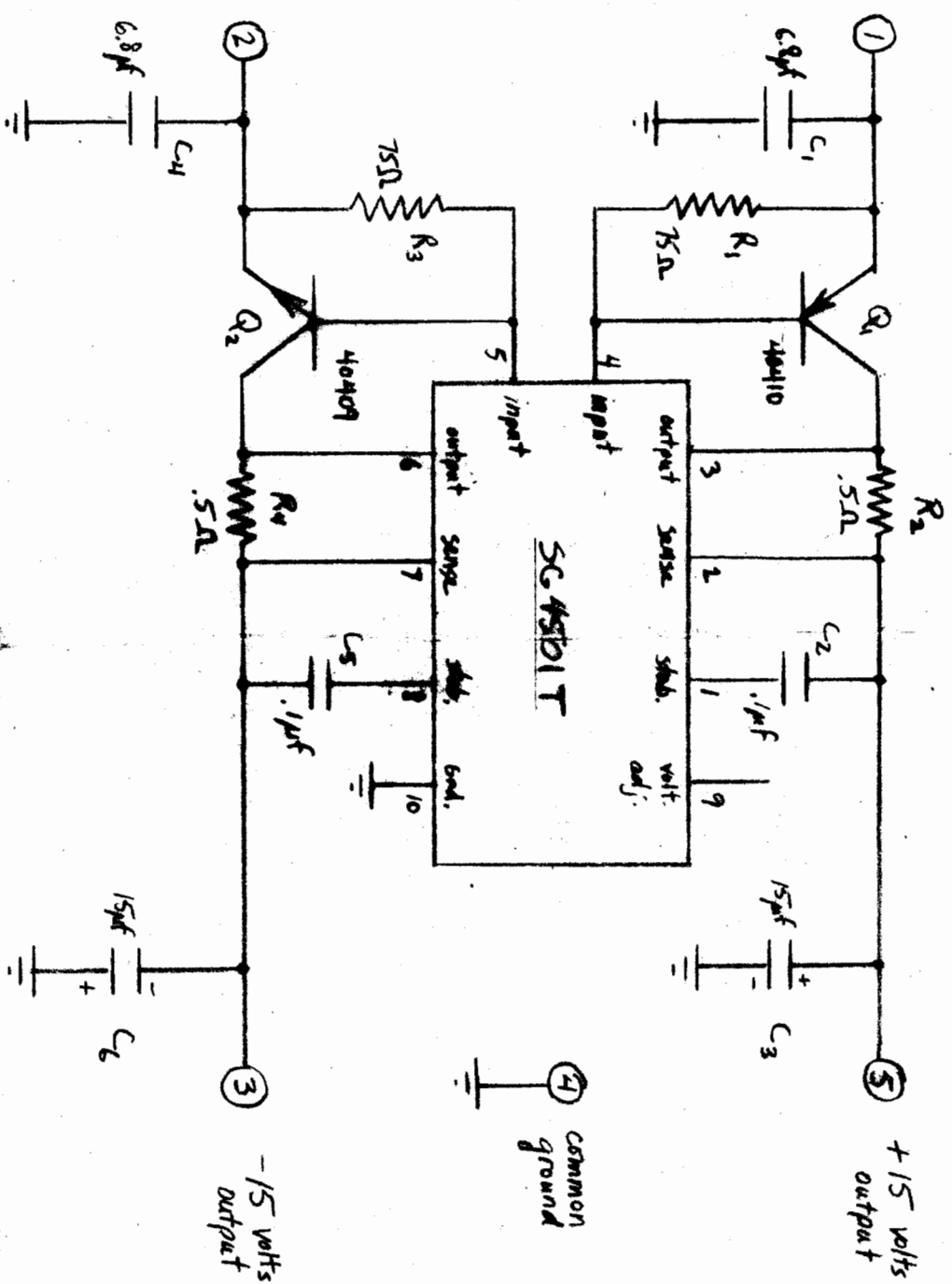


PC 105

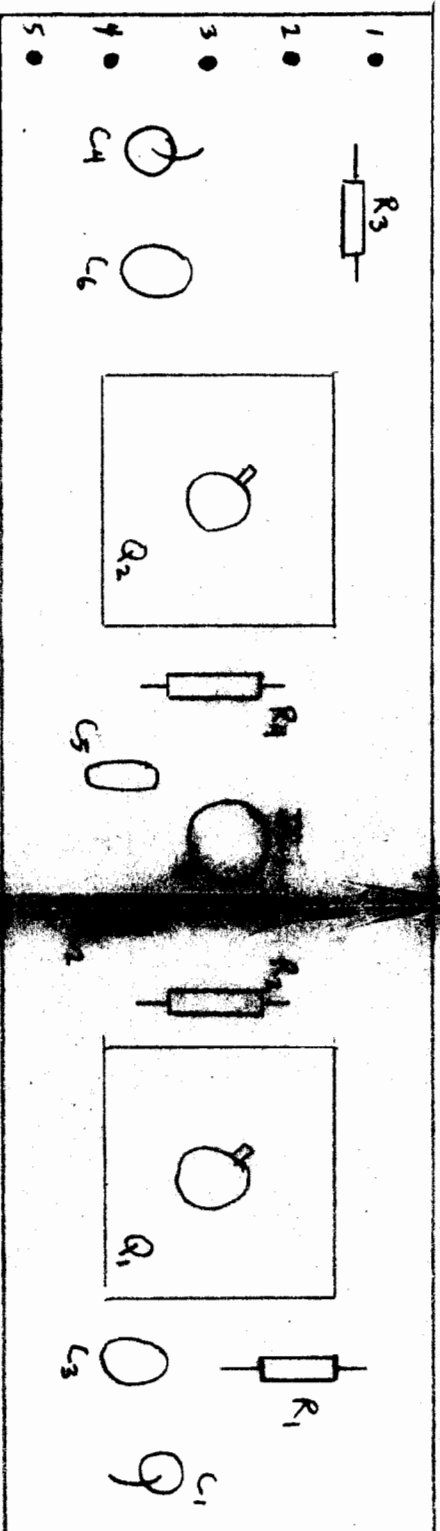
± 15V REGULATED

POWER SUPPLY BOARD

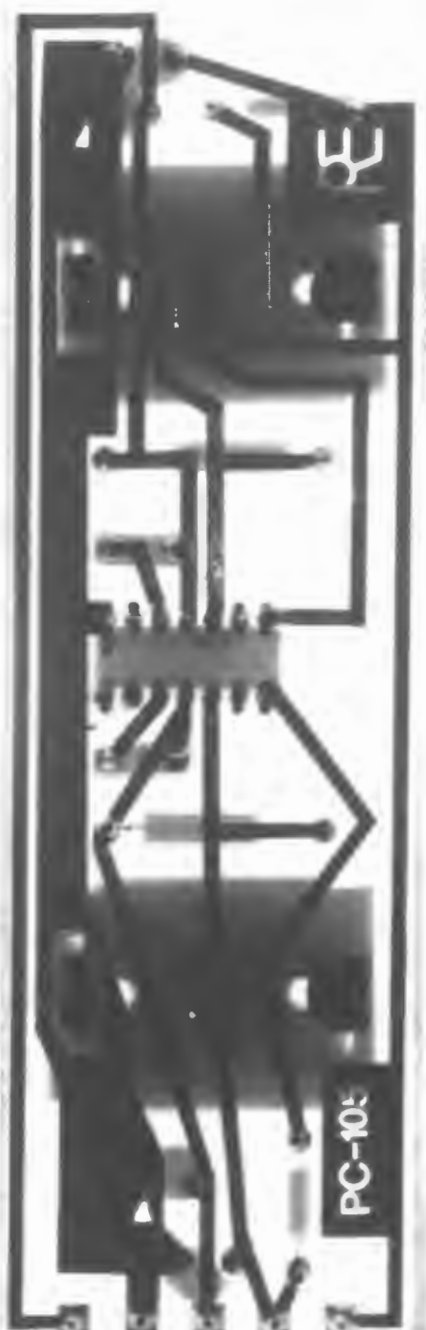
(CONTINUED)



Top View



PC 105 - ±15V regulated  
power supply board

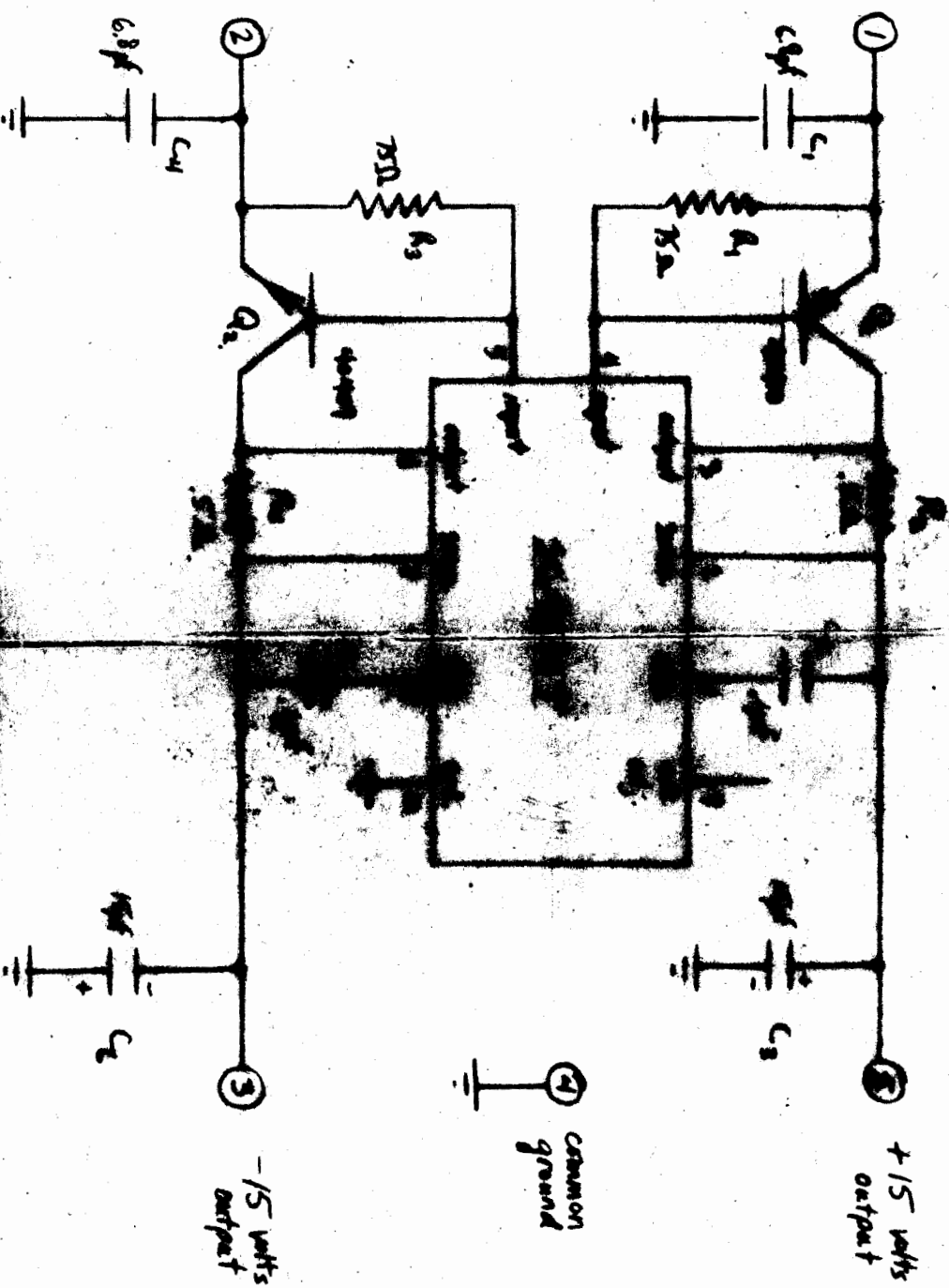


+20 IN  
 -20 IN  
 -15 OUT  
 GND  
 +15 OUT

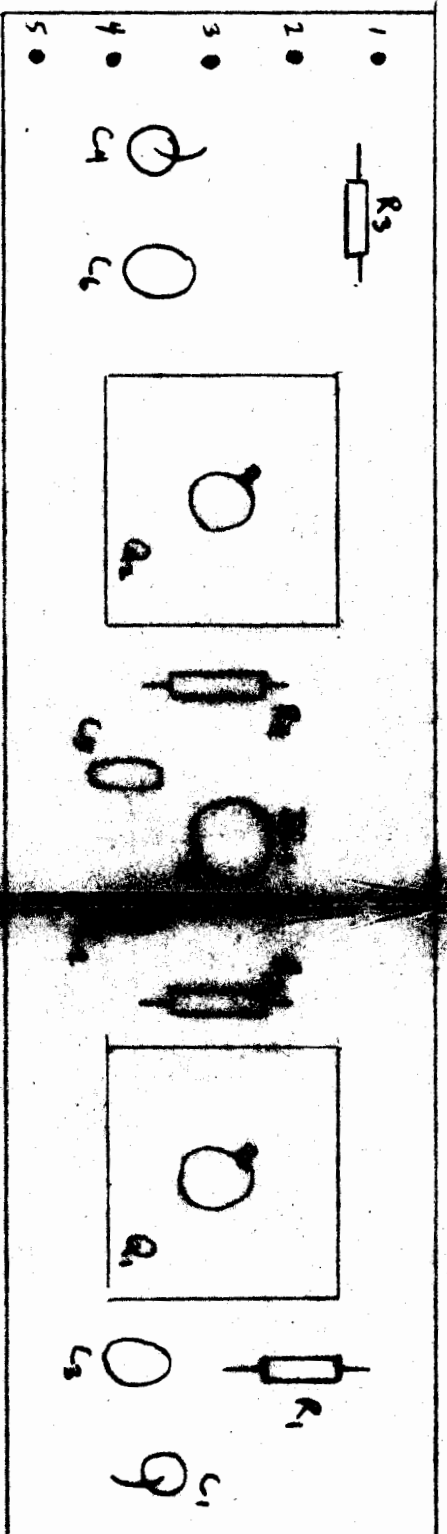


+15 OUT  
 GND  
 -15 OUT  
 -20 IN  
 +20 IN

# PC 105 ± 15V REGULATED POWER SUPPLY BOARD (2 AMPS)



Top View



PC 105 - ±  
power supply



PC-114

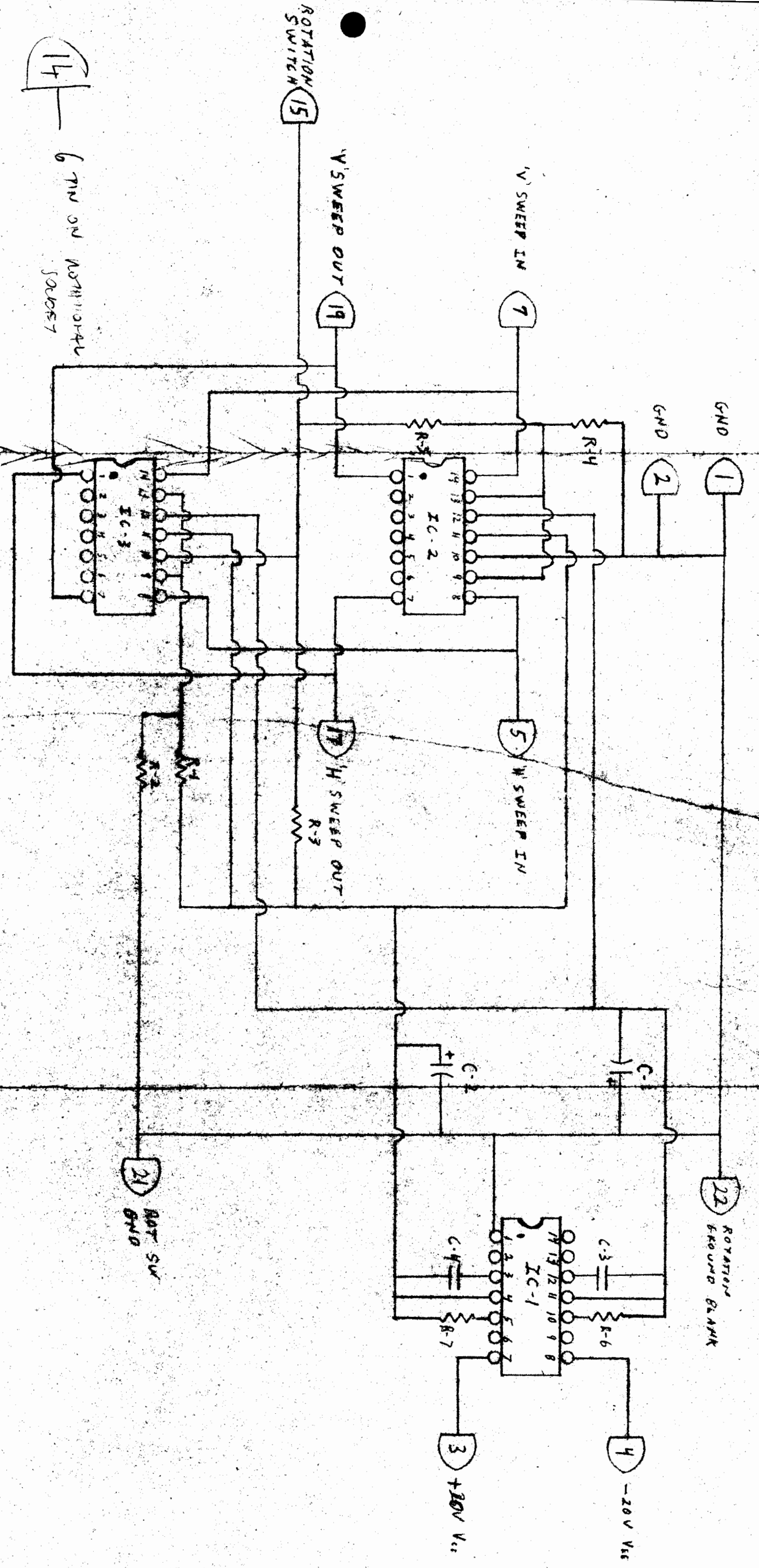
+ 50mA  
- 10mA

C-1	154 20V
C-2	154 20V
C-3	.14
C-4	.14
R-1	2.2K
R-2	4.7K
R-3	1K
R-4	4.7K
R-5	1K
R-6	24k.52
R-7	11.52

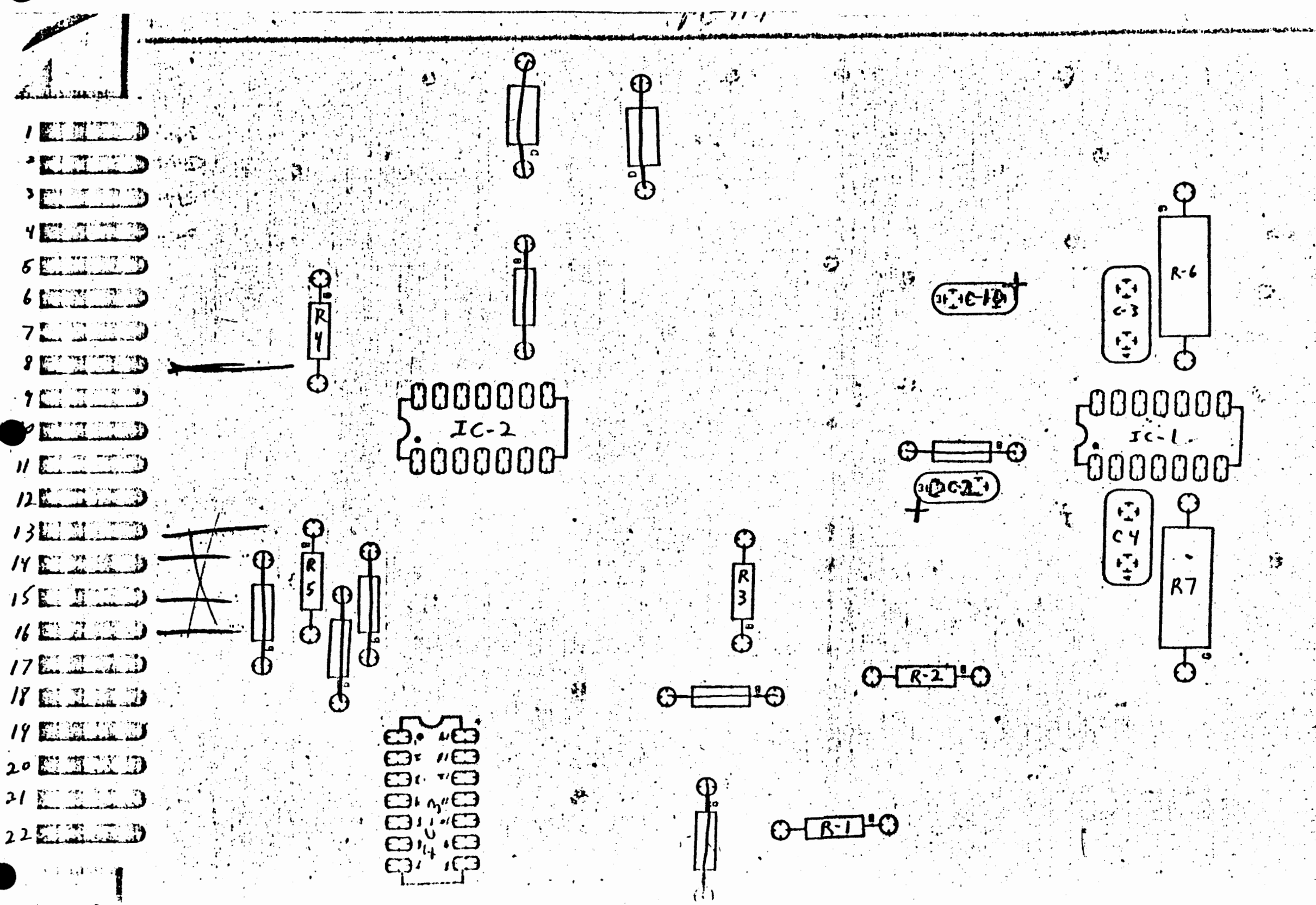
IC-1	SE4501 Regulator
IC-2	Alt Full
AT0134C0-3IC-3	11 11 1

4C5  
69

14 — 6 pin on 107H110-4L  
 source  
 16 — 2 on 107  
 107H110-4L



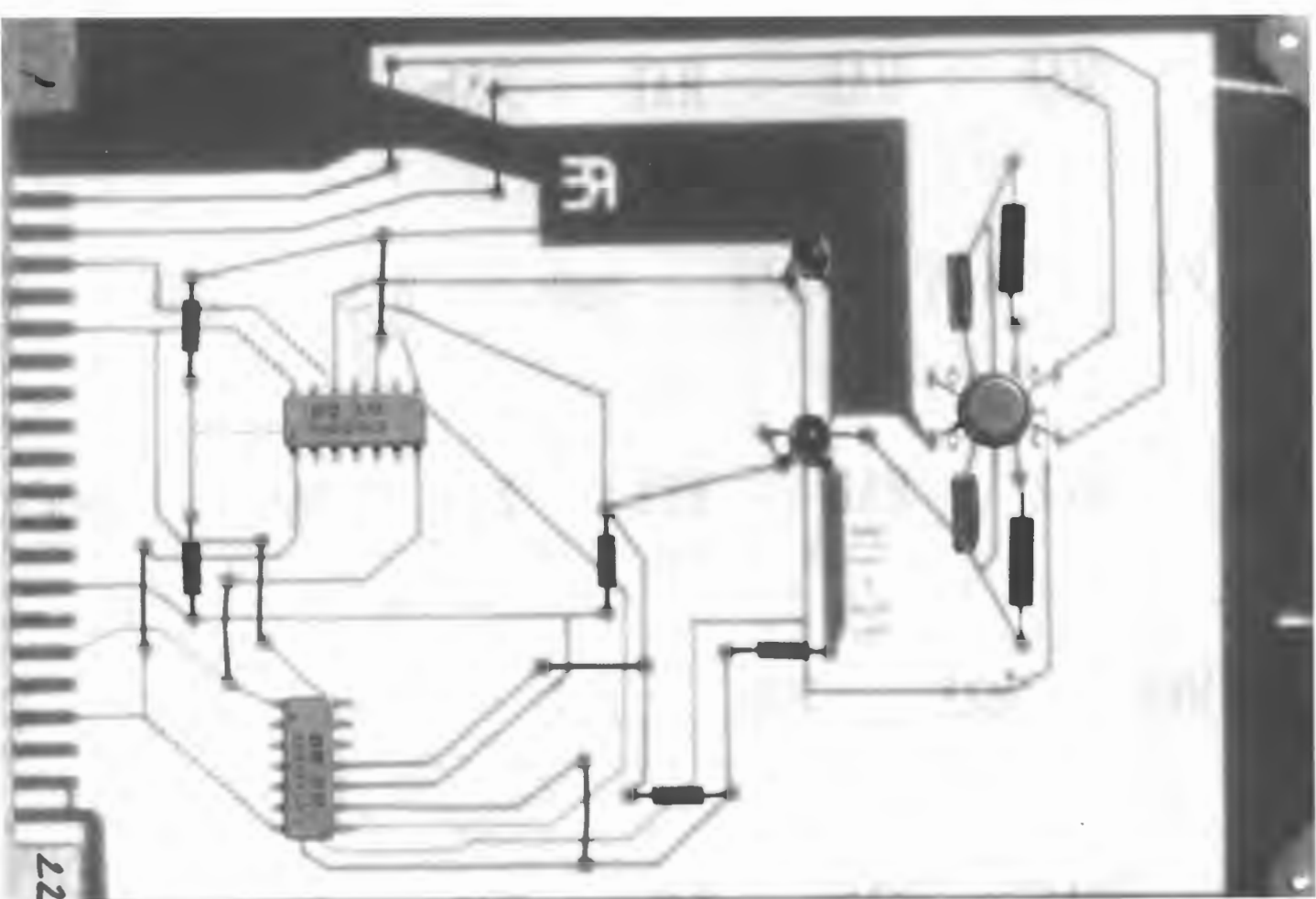
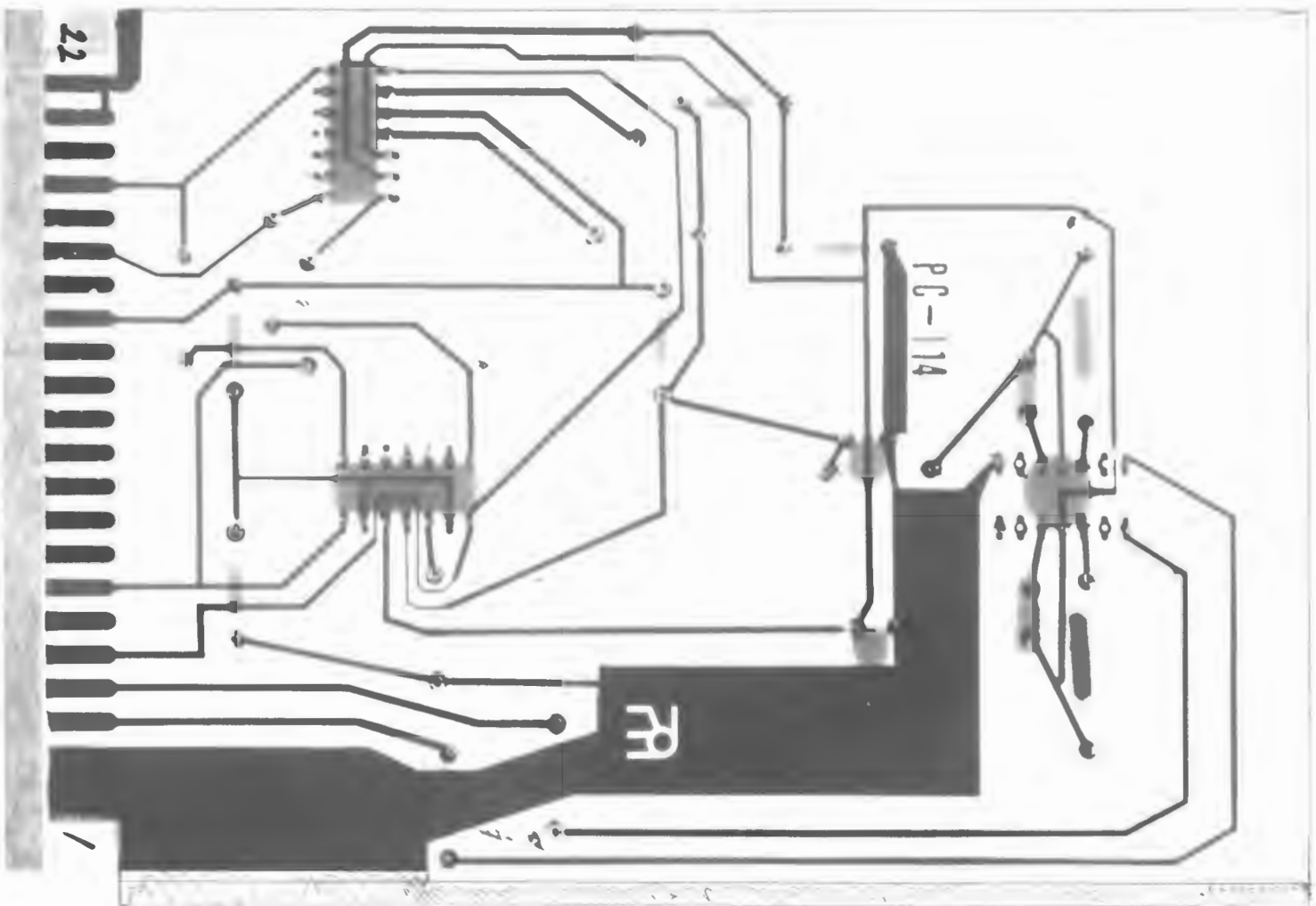
PC-114



PC-114

HCS  
53





-R-1	2N211	NPN	100PF	-R-1	100K	-R-47	75Ω
-R-2	2N211	NPN	100PF	-R-2	5.6K	-R-48	5.2Ω
-R-3	2N211	NPN	100PF	-R-3	4.7K	-R-49	5.2Ω
-R-4	2N211	NPN	100PF	-R-4	2.2K	-R-50	33K
-R-5	2N211	NPN	100PF	-R-5	2.2K	-R-51	15K
-R-6	2N211	NPN	100PF	-R-6	15K	-R-52	15K
-R-7	2N211	NPN	100PF	-R-7	15K	-R-53	15K
-R-8	2N211	NPN	100PF	-R-8	15K	-R-54	15K
-R-9	2N211	NPN	100PF	-R-9	15K	-R-55	15K
-R-10	2N211	NPN	100PF	-R-10	2.2K	-R-56	15K
-R-11	2N211	NPN	100PF	-R-11	2.2K	-R-57	15K
-R-12	2N211	NPN	100PF	-R-12	2.2K	-R-58	15K
-R-13	2N211	NPN	100PF	-R-13	2.2K	-R-59	15K
-R-14	2N211	NPN	100PF	-R-14	50K	-R-60	6.8K
-R-15	2N211	NPN	100PF	-R-15	50K	-R-61	6.8K
-R-16	2N211	NPN	100PF	-R-16	50K	-R-62	15K
-R-17	2N211	NPN	100PF	-R-17	120K	-R-63	15K
-R-18	2N211	NPN	100PF	-R-18	150K	-R-64	15K
-R-19	2N211	NPN	100PF	-R-19	50K	-R-65	15K
-R-20	2N211	NPN	100PF	-R-20	47K	-R-66	15K
-R-21	2N211	NPN	100PF	-R-21	47K	-R-67	15K
-R-22	2N211	NPN	100PF	-R-22	47K	-R-68	15K
-R-23	2N211	NPN	100PF	-R-23	47K	-R-69	15K
-R-24	2N211	NPN	100PF	-R-24	47K	-R-70	15K
-R-25	2N211	NPN	100PF	-R-25	47K	-R-71	15K
-R-26	2N211	NPN	100PF	-R-26	47K	-R-72	15K
-R-27	2N211	NPN	100PF	-R-27	47K	-R-73	15K
-R-28	2N211	NPN	100PF	-R-28	47K	-R-74	15K
-R-29	2N211	NPN	100PF	-R-29	47K	-R-75	15K
-R-30	2N211	NPN	100PF	-R-30	47K	-R-76	15K
-R-31	2N211	NPN	100PF	-R-31	47K	-R-77	15K
-R-32	2N211	NPN	100PF	-R-32	47K	-R-78	15K
-R-33	2N211	NPN	100PF	-R-33	47K	-R-79	15K
-R-34	2N211	NPN	100PF	-R-34	47K	-R-80	15K
-R-35	2N211	NPN	100PF	-R-35	47K	-R-81	15K
-R-36	2N211	NPN	100PF	-R-36	47K	-R-82	15K
-R-37	2N211	NPN	100PF	-R-37	47K	-R-83	15K
-R-38	2N211	NPN	100PF	-R-38	47K	-R-84	15K
-R-39	2N211	NPN	100PF	-R-39	47K	-R-85	15K
-R-40	2N211	NPN	100PF	-R-40	47K	-R-86	15K
-R-41	2N211	NPN	100PF	-R-41	47K	-R-87	15K
-R-42	2N211	NPN	100PF	-R-42	47K	-R-88	15K
-R-43	2N211	NPN	100PF	-R-43	47K	-R-89	15K
-R-44	2N211	NPN	100PF	-R-44	47K	-R-90	15K

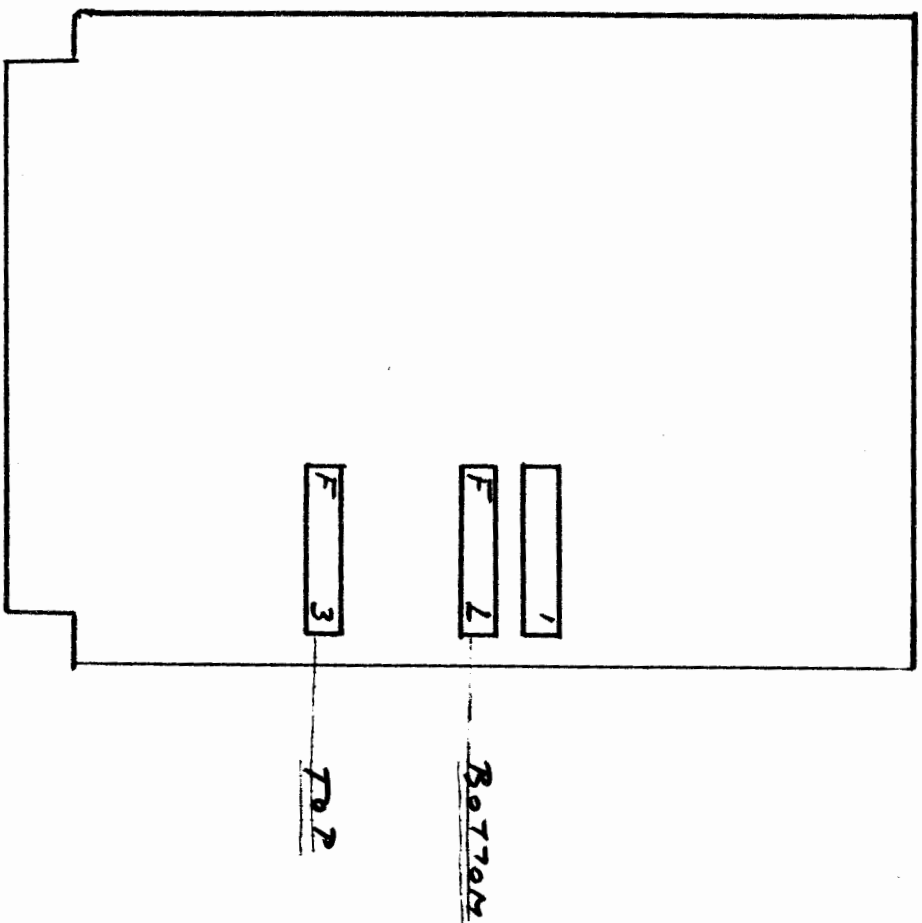
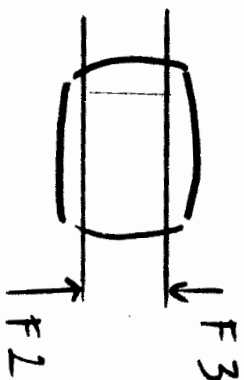
-R-1	2N211	NPN	100PF	-R-1	100K	-R-47	75Ω
-R-2	2N211	NPN	100PF	-R-2	5.6K	-R-48	5.2Ω
-R-3	2N211	NPN	100PF	-R-3	4.7K	-R-49	5.2Ω
-R-4	2N211	NPN	100PF	-R-4	2.2K	-R-50	33K
-R-5	2N211	NPN	100PF	-R-5	2.2K	-R-51	15K
-R-6	2N211	NPN	100PF	-R-6	15K	-R-52	15K
-R-7	2N211	NPN	100PF	-R-7	15K	-R-53	15K
-R-8	2N211	NPN	100PF	-R-8	15K	-R-54	15K
-R-9	2N211	NPN	100PF	-R-9	15K	-R-55	15K
-R-10	2N211	NPN	100PF	-R-10	2.2K	-R-56	15K
-R-11	2N211	NPN	100PF	-R-11	2.2K	-R-57	15K
-R-12	2N211	NPN	100PF	-R-12	2.2K	-R-58	15K
-R-13	2N211	NPN	100PF	-R-13	2.2K	-R-59	15K
-R-14	2N211	NPN	100PF	-R-14	50K	-R-60	6.8K
-R-15	2N211	NPN	100PF	-R-15	50K	-R-61	6.8K
-R-16	2N211	NPN	100PF	-R-16	50K	-R-62	15K
-R-17	2N211	NPN	100PF	-R-17	120K	-R-63	15K
-R-18	2N211	NPN	100PF	-R-18	150K	-R-64	15K
-R-19	2N211	NPN	100PF	-R-19	50K	-R-65	15K
-R-20	2N211	NPN	100PF	-R-20	47K	-R-66	15K
-R-21	2N211	NPN	100PF	-R-21	47K	-R-67	15K
-R-22	2N211	NPN	100PF	-R-22	47K	-R-68	15K
-R-23	2N211	NPN	100PF	-R-23	47K	-R-69	15K
-R-24	2N211	NPN	100PF	-R-24	47K	-R-70	15K
-R-25	2N211	NPN	100PF	-R-25	47K	-R-71	15K
-R-26	2N211	NPN	100PF	-R-26	47K	-R-72	15K
-R-27	2N211	NPN	100PF	-R-27	47K	-R-73	15K
-R-28	2N211	NPN	100PF	-R-28	47K	-R-74	15K
-R-29	2N211	NPN	100PF	-R-29	47K	-R-75	15K
-R-30	2N211	NPN	100PF	-R-30	47K	-R-76	15K
-R-31	2N211	NPN	100PF	-R-31	47K	-R-77	15K
-R-32	2N211	NPN	100PF	-R-32	47K	-R-78	15K
-R-33	2N211	NPN	100PF	-R-33	47K	-R-79	15K
-R-34	2N211	NPN	100PF	-R-34	47K	-R-80	15K
-R-35	2N211	NPN	100PF	-R-35	47K	-R-81	15K
-R-36	2N211	NPN	100PF	-R-36	47K	-R-82	15K
-R-37	2N211	NPN	100PF	-R-37	47K	-R-83	15K
-R-38	2N211	NPN	100PF	-R-38	47K	-R-84	15K
-R-39	2N211	NPN	100PF	-R-39	47K	-R-85	15K
-R-40	2N211	NPN	100PF	-R-40	47K	-R-86	15K
-R-41	2N211	NPN	100PF	-R-41	47K	-R-87	15K
-R-42	2N211	NPN	100PF	-R-42	47K	-R-88	15K
-R-43	2N211	NPN	100PF	-R-43	47K	-R-89	15K
-R-44	2N211	NPN	100PF	-R-44	47K	-R-90	15K

\* ADD 1MEG RESISTOR BETWEEN  
PIN 1 + 3 TC-1

HCS  
40

VEATICAL CENTER  
TOP/BOTTOM BRANCHES ADD.

PC 115





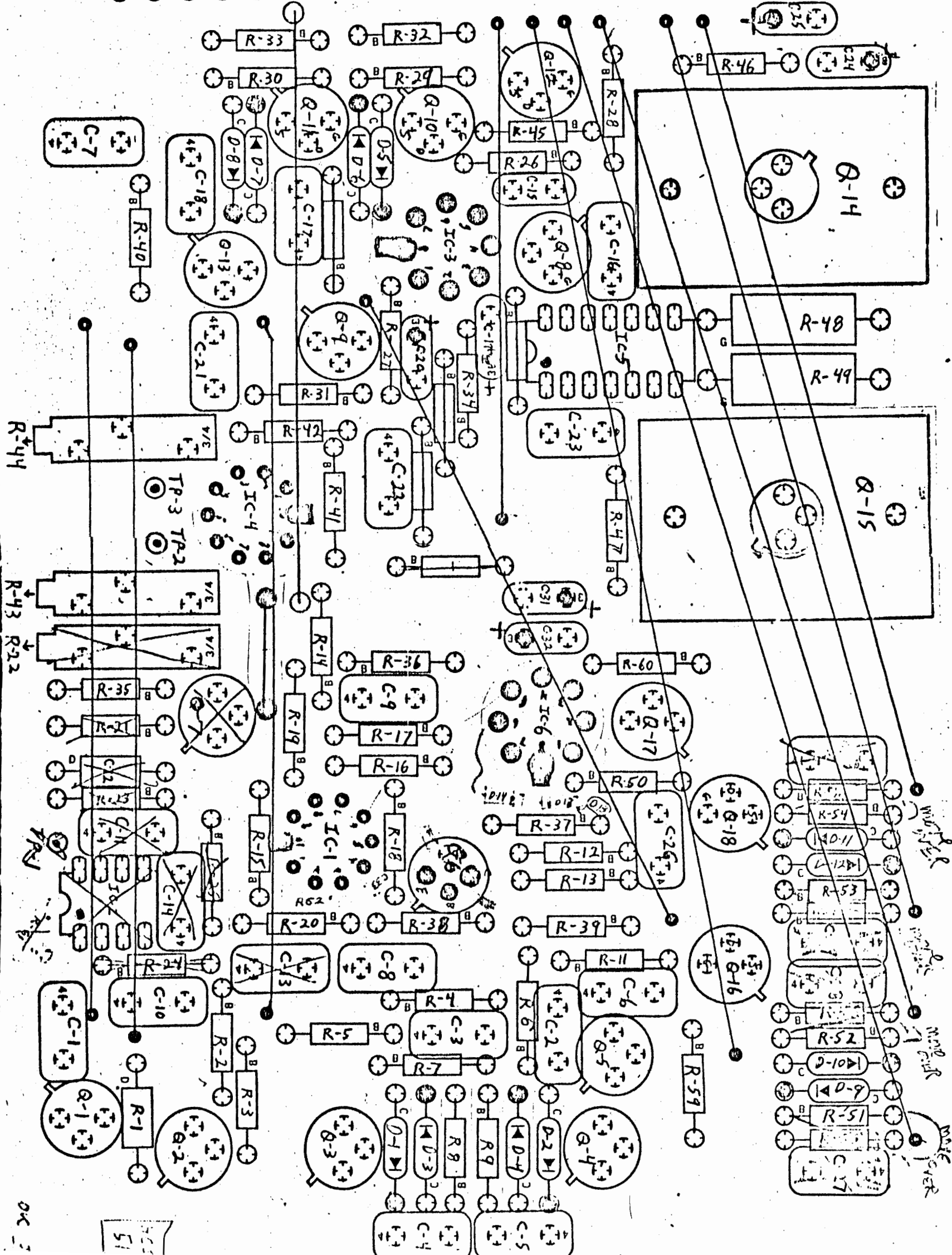
Top View

# PC-115A RUTT ELECTROPHYSICS

APRIL 1974

- 1 GND
- 2 GND
- 3 +20V
- 4 -20V
- 5 L1 HD
- 6 B1 HD
- 7 V SWEEP OUT
- 8 L2 HD
- 9 B2 HD
- 10 HD OUT
- 11 DUAL TRACE
- 12 V1 CENT #2
- 13
- 14 V SWEEP IN
- 15
- 16 V1 CENT #1
- 17 POSITION POT
- 18
- 19
- 20 DUAL TRACE SWITCH
- 21 H MODULE SYNC IN
- 22 BLANK OUT

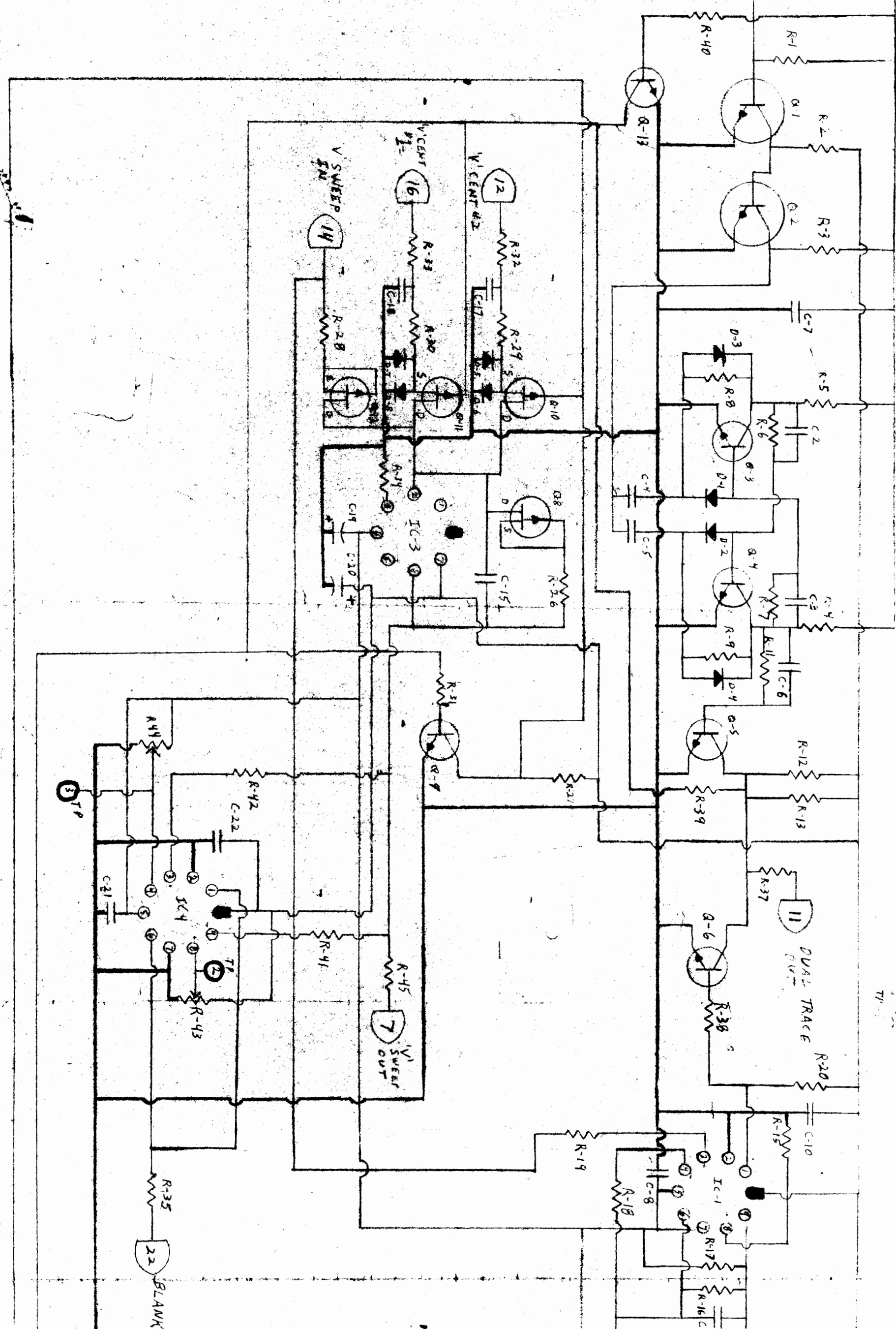
506  
TOP VIEW



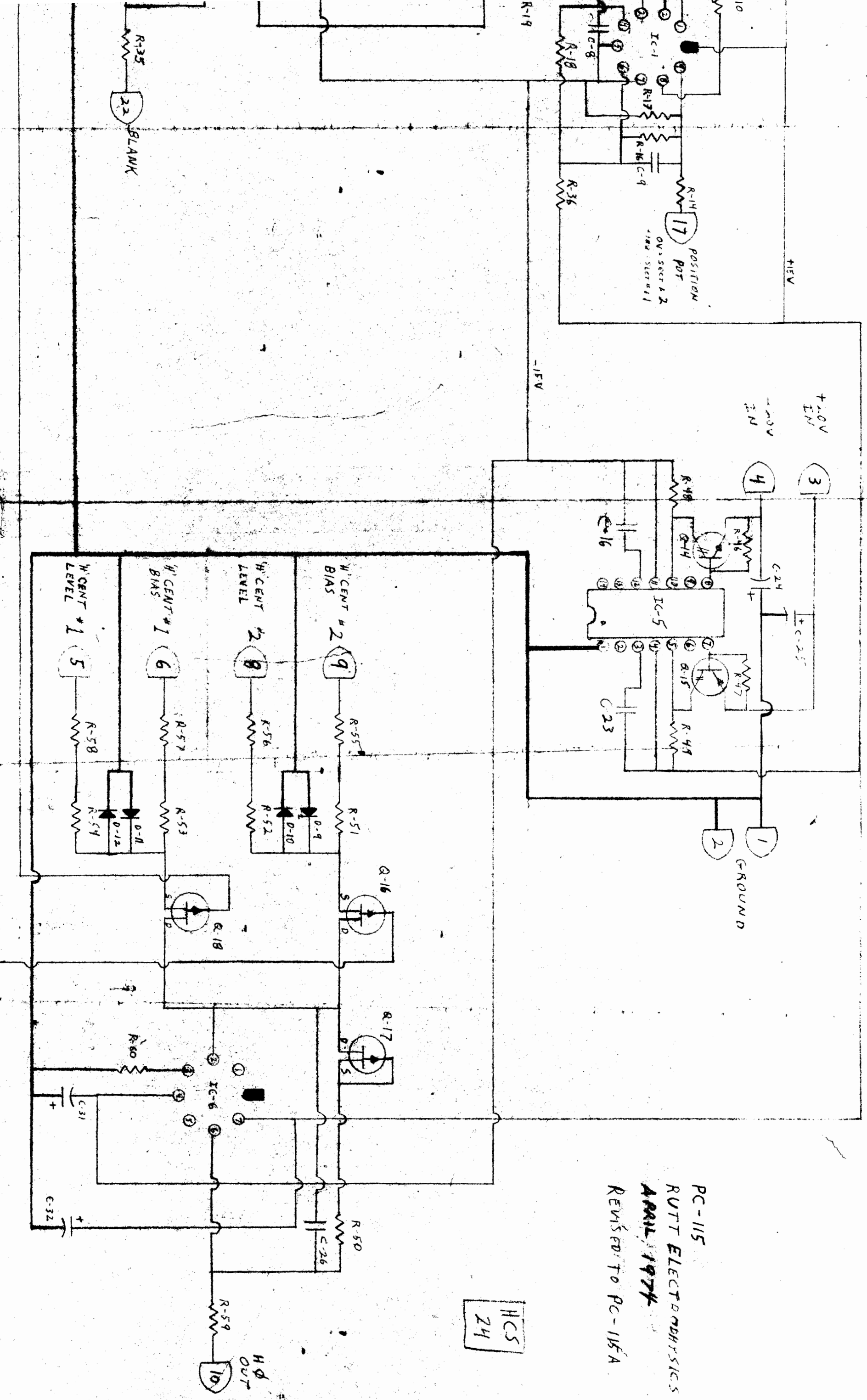
OK

20

21



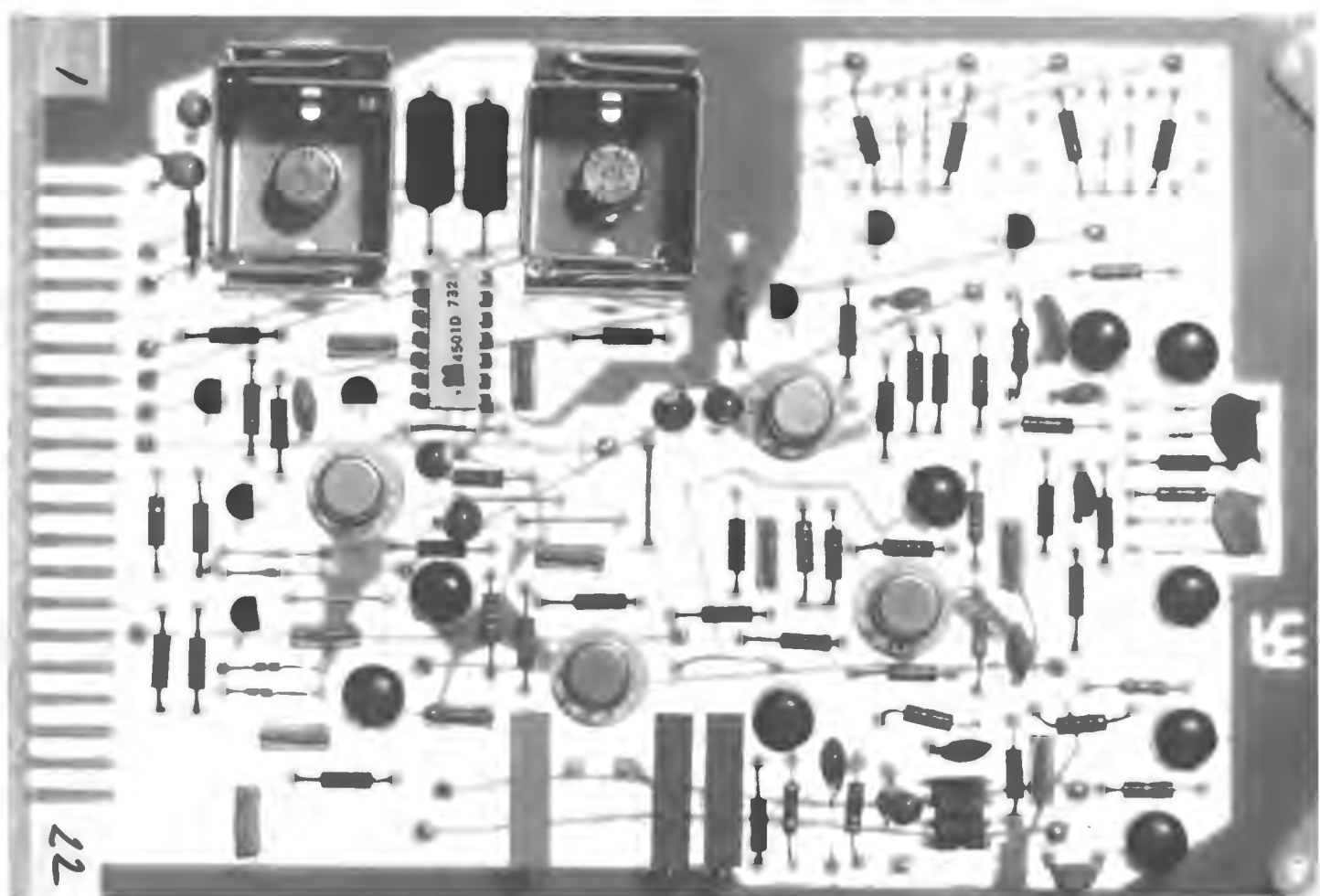
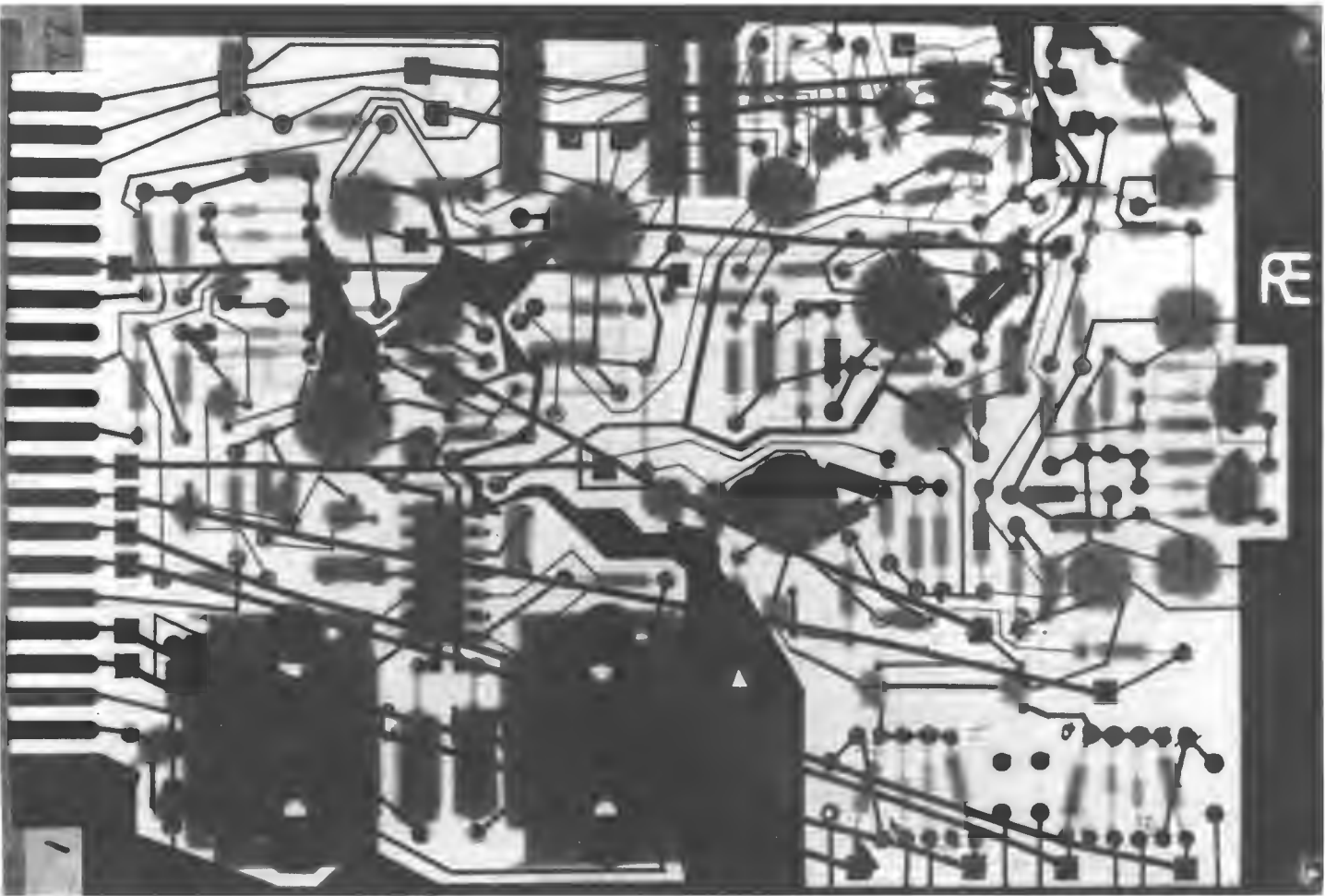
R21, 22, 23, 24, 25  
A-7  
I-2  
TP-1



PC-115  
RUTT ELECTROPHYSICS  
APRIL 1974  
REVISED TO PC-115A

HCS  
24





TRONOTEC, INC.  
Church Road Laboratory  
Franklin, New Jersey

# PARTS LIST

DATE 12/5/75 PROJECT RE 4 1/2

ASSY PC-116A ~~PC-116A~~ Display DRAWING

SHEET 1 OF 1

REF	DESCRIPTION	MFR PART NR.	MFR.	TRONOTEC PM	QTY	UNIT	PRICE	TOTAL
IC-1	COMPARATOR	LM311	NSC		1			
IC3,4	TIMER	NE555V	SIG		2			
Q1,3,5,6, 8,10	NPN	2N3568			2			
Q2,7,9	PNP	2N3638A			1			
Q4	FET	2N4091			1			
D1,2	DIODE, Silicon, Signal	1N914			2			
C1,3,5,6	Capacitor, Electro-Tant	15uF/20V			4			
C2,4,12, 14,15	" Ceramic	1uF			4			
C7	" "	10pF			1			
C8	" Mylar	10uF			1			
C11	" Ceramic	100pF			1			
C13	" "	470pF			1			
C16	" "	220pF			1			
C17	" "	5pF			1			
R1,21,30, 32,35,27	Resistor - 1/4W 5%	1K $\Omega$			6			
R2	"	270K			1			
R3	"	47K			1			

DATE 12/5/75

PROJECT PE 4<sup>th</sup>

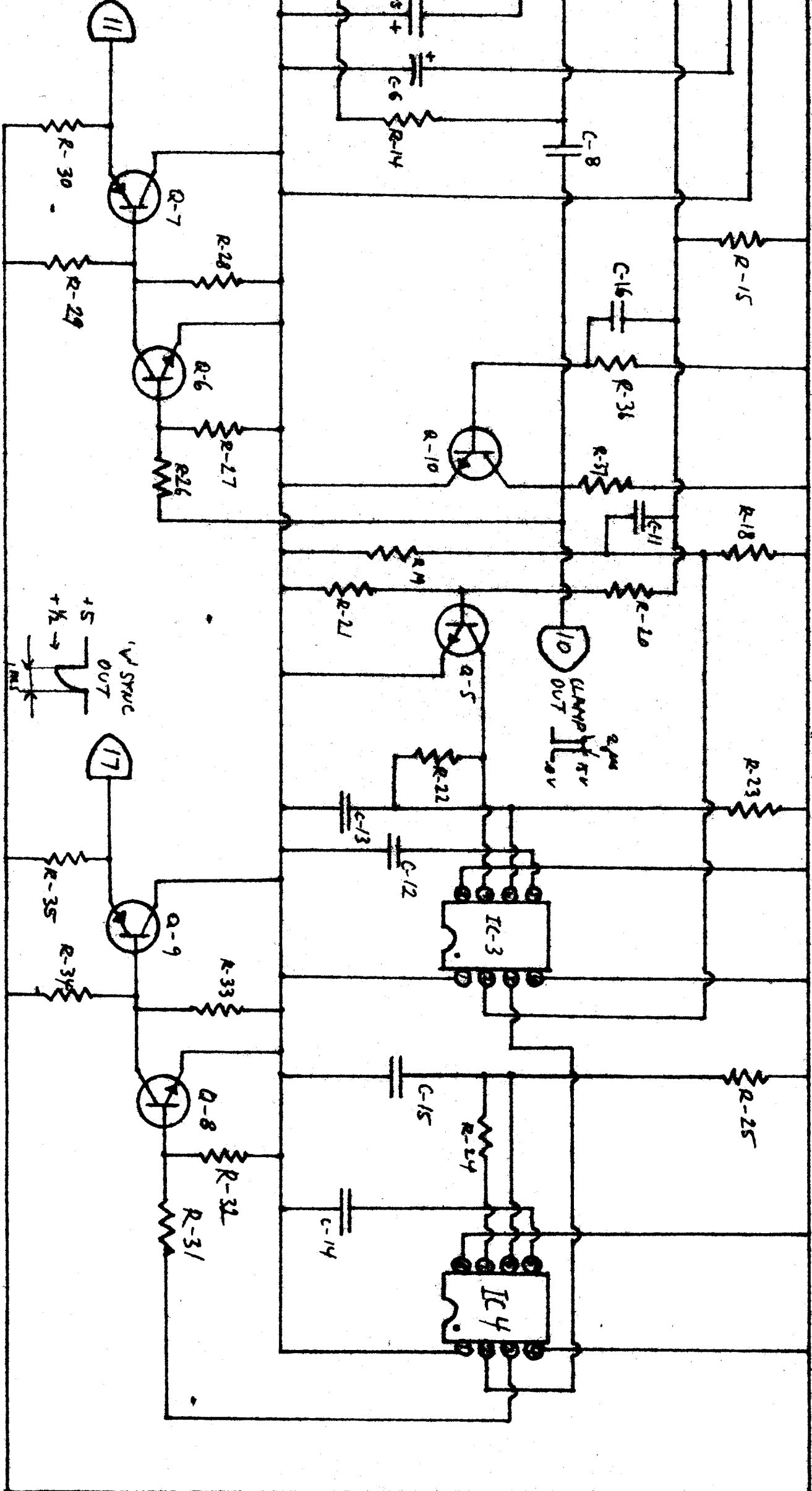
ASSY AC 116A (DCU)

DRAWING

SHEET 2 OF

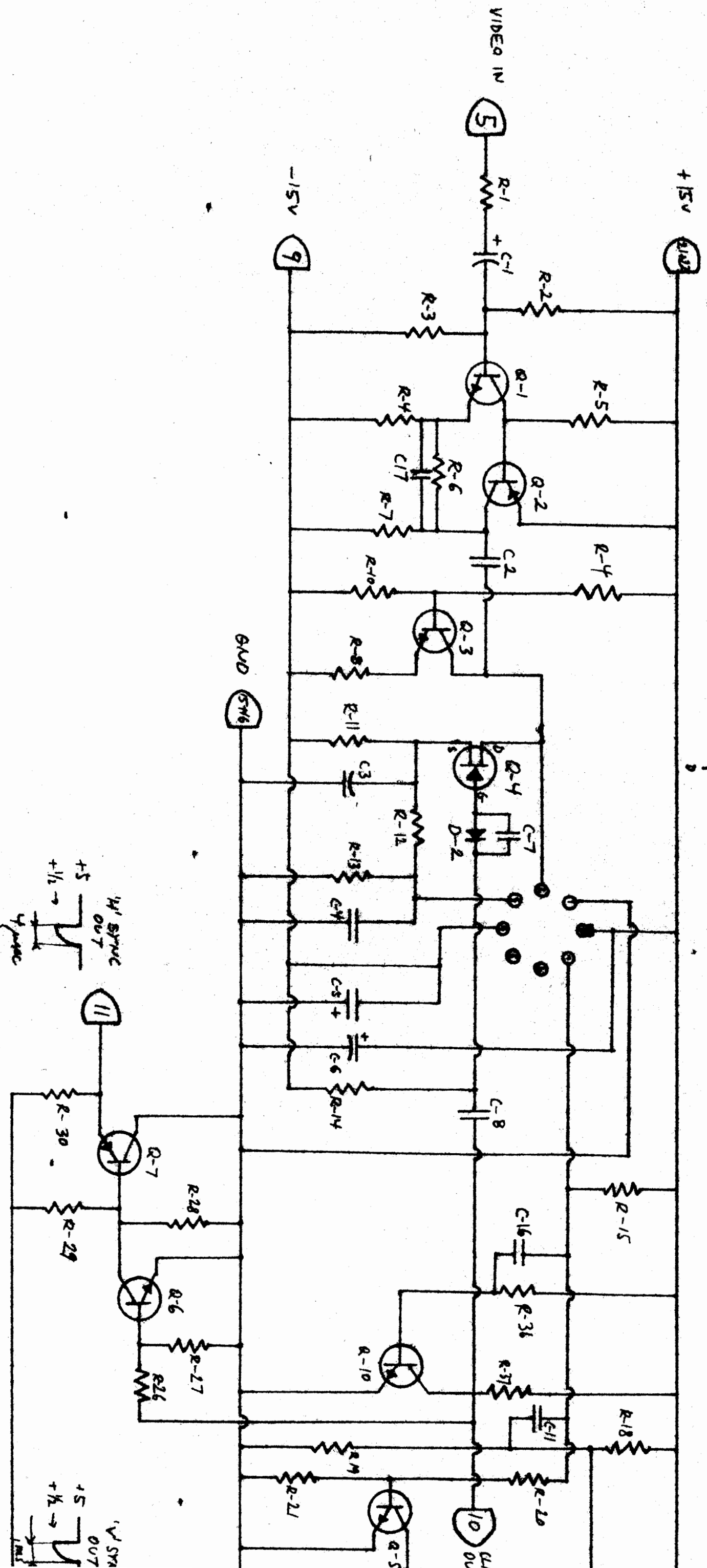
REF	DESCRIPTION	MFR PART NR.	MFR.	TRONOTEC PN	QTY	UNIT PRICE	TOTAL
R4,5,7	Resistor 4W-50%				4		
R6,18,20					6		
R12,31					1		
R8					1		
R9					1		
R10					1		
R11,13					2		
R12					1		
R14					1		
R19,23					2		
R22,24					2		
R28,33					1		
R29,34					2		
R36					1		
R37					1		

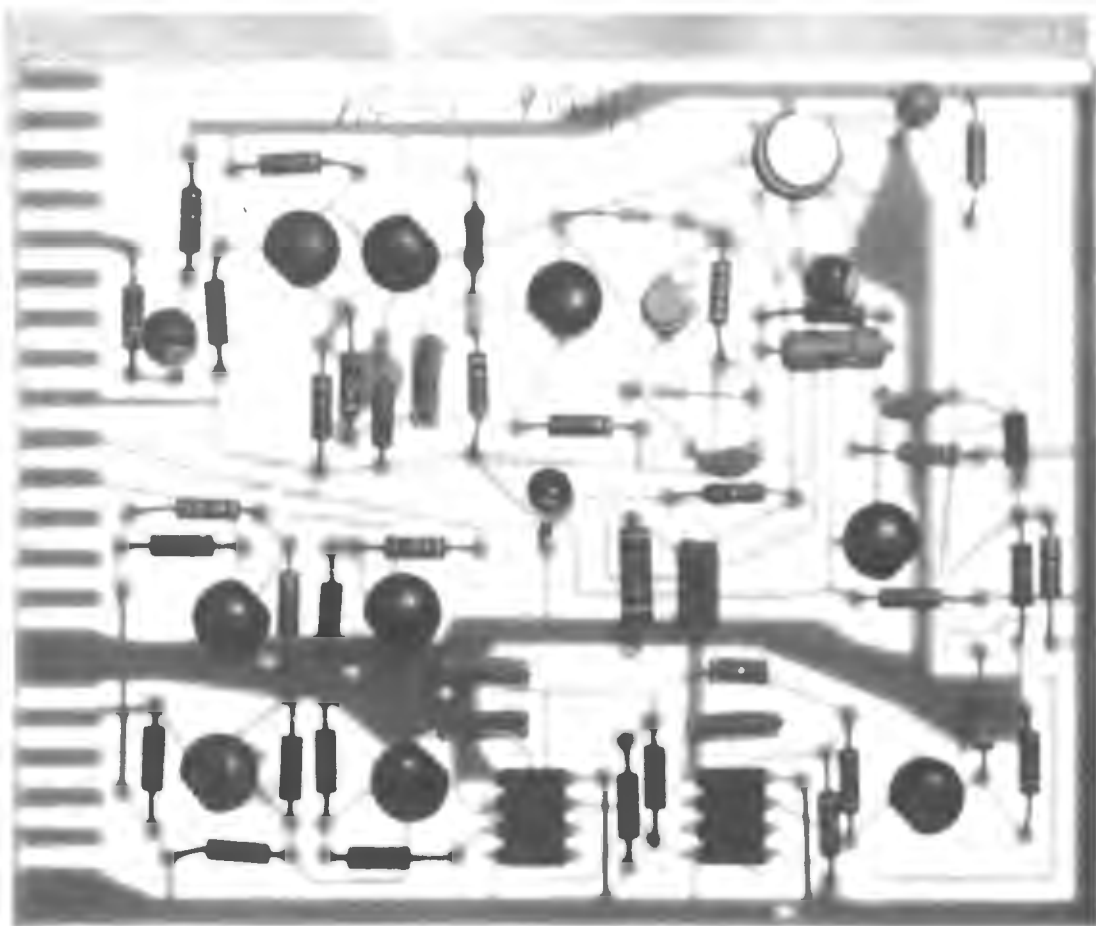
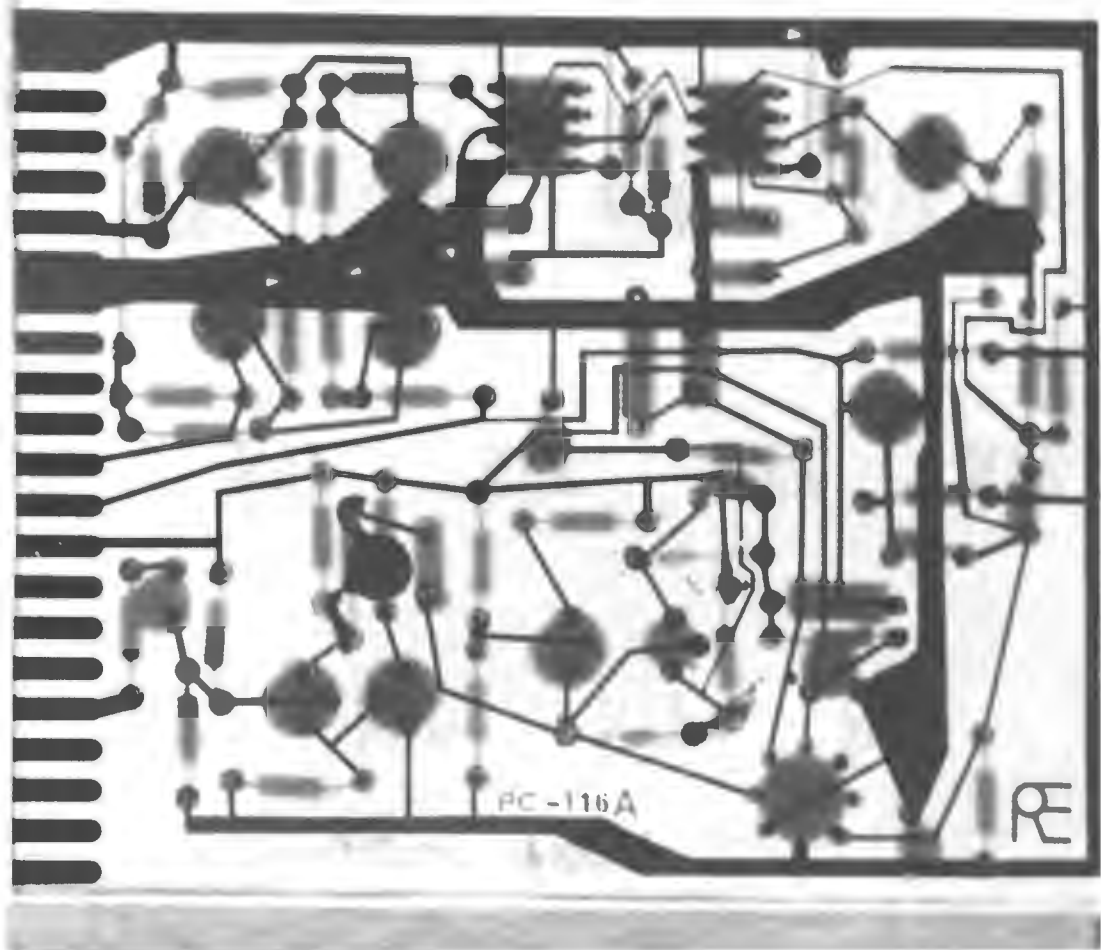




PC-116  
 RUTT ELECTRONICS  
 APR 1974  
 MODIFIED TO 116A

TOP VIEW





Q-1 FEB - 5462  
 Q-2 FEB  
 Q-3 FEB  
 Q-4 NPN - 3508  
 Q-5 NPN - 3638  
 Q-6 NPN - 3568  
 Q-7 40409  
 Q-8 40410  
 Q-9 FEB  
 Q-10 FEB

+50M4  
 -20M4

B-1 1N914  
 B-2 9.1V ZENER  
 B-3 1N914  
 B-4  
 B-5  
 B-6  
 B-7

~~Q-1~~  
~~Q-2~~  
~~Q-3~~  
~~Q-4~~  
~~Q-5~~  
~~Q-6~~  
~~Q-7~~

IC1 LM 318 OP-AMP

IC3 LM 318 OP-AMP  
 IC4 SG-4501 AL REGULATOR

IC2 MC1494 DIP

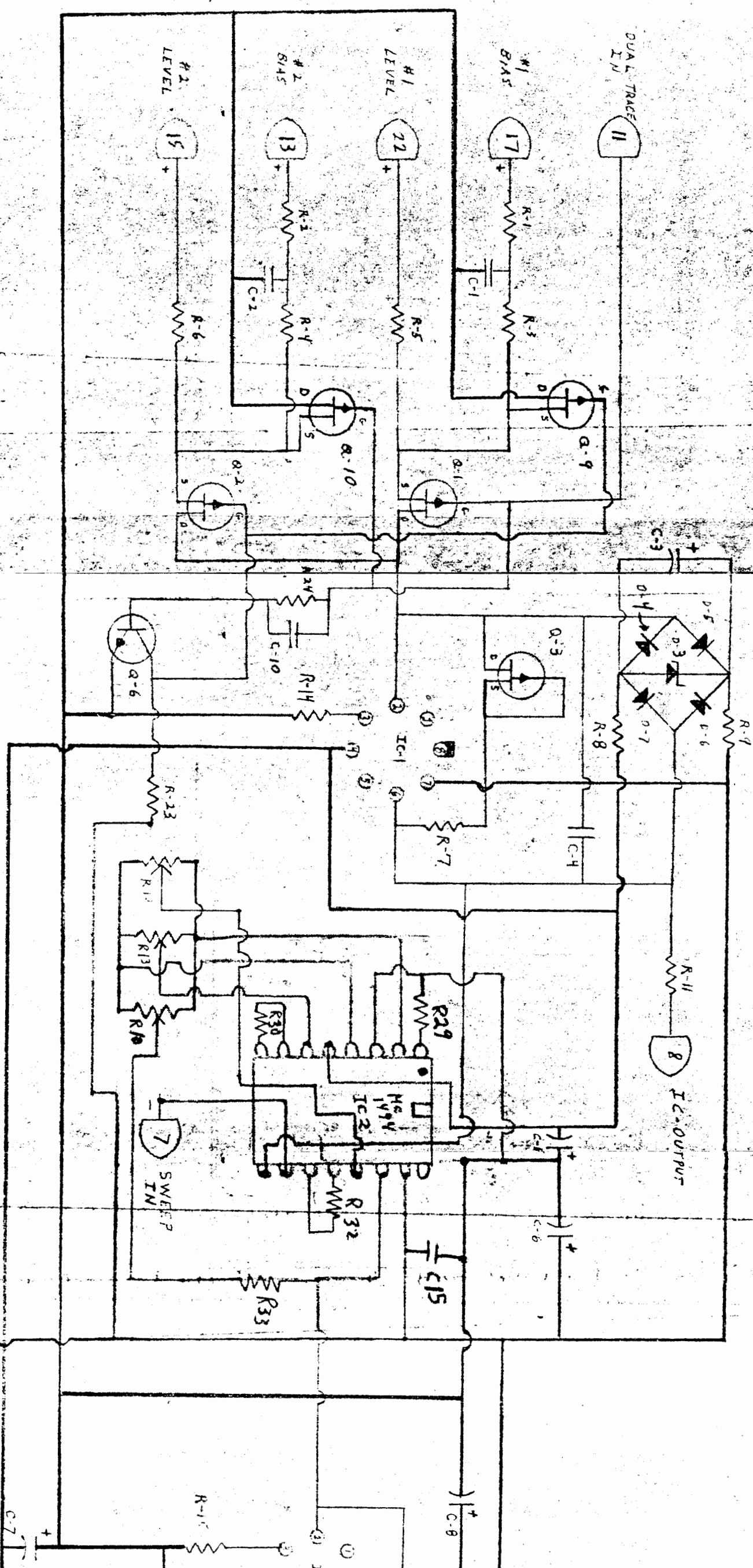
R-10 OUTPUT OFFSET  
 R-12 X.  
 R-13 Y.  
 R-16 SCALE FACTOR

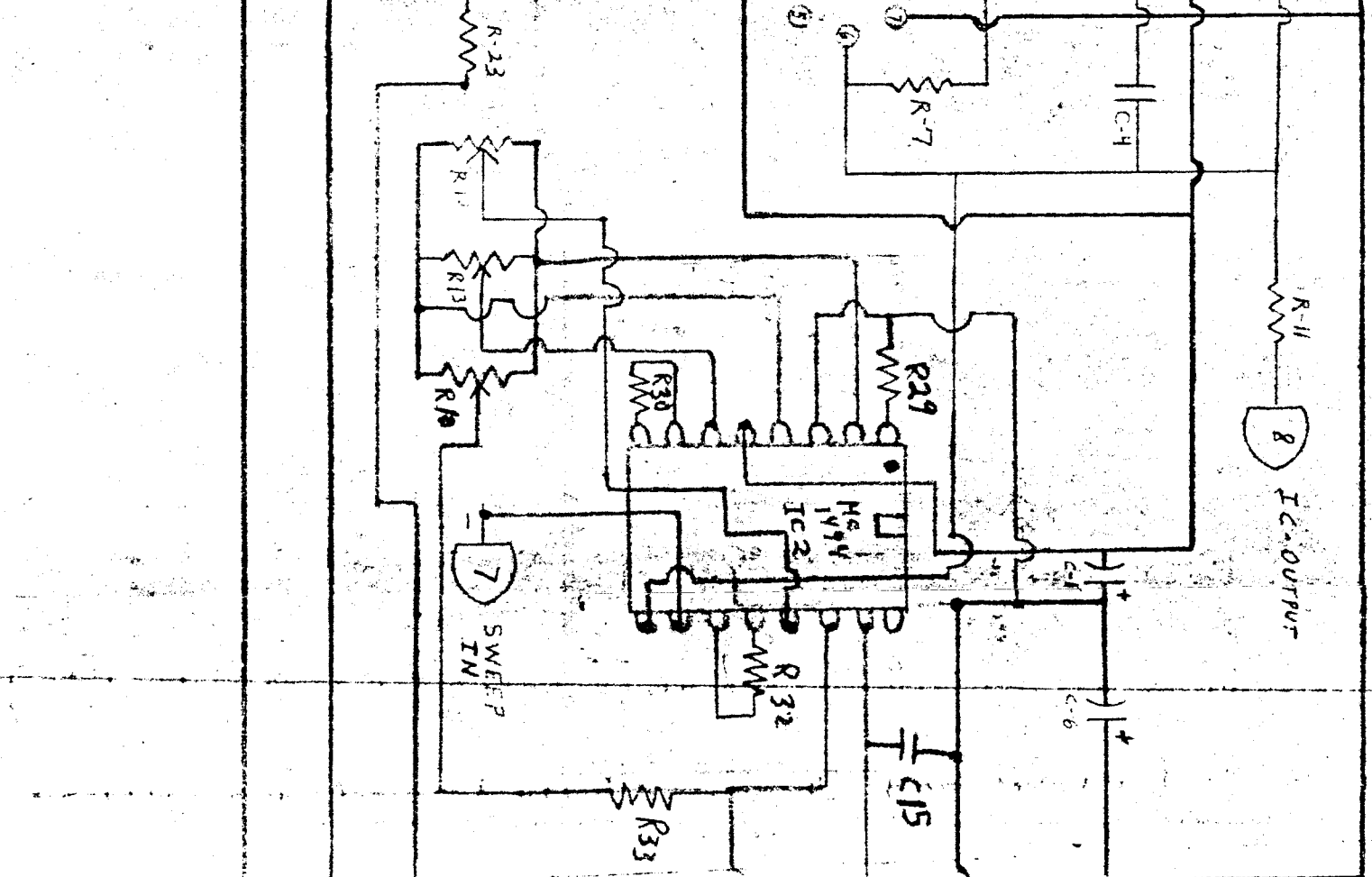
C-1 .1u-  
 C-2 .1u-  
 C-3 15u-20V-  
 C-4 5PF-  
 C-5 15u-20V-  
 C-6 15u-20V-  
 C-7 15u-20V-  
 C-8 15u-20V-  
 C-9 5PF  
 C-10 100PF-  
 C-11 10u-25V-  
 C-12 10u-25V-  
 C-13 .1u-  
 C-14 .1u-  
 C-15 .1u-  
 R-1 510K 2-  
 R-2 510K -  
 R-3 4.7K 4-  
 R-4 4.7K -  
 R-5 4.7K -  
 R-6 4.7K -  
 R-7 10K 4-  
 R-8 15K -  
 R-9 15K -  
 R-10 5K 100 (200V)  
 R-11 1K +  
 R-12 20K POT -  
 R-13 20K POT -  
 R-14 2.7K 1-  
 R-15 10K  
 R-16 10K POT -  
 R-17 10K -  
 R-18 10K -  
 R-19 4.7K 2-  
 R-20 4.7K -  
 R-21 75K 1-  
 R-22 75K -  
 R-23 10K -  
 R-24 33K 2-  
 R-25 75K -  
 R-26 75K -  
 R-27 52K DALE  
 R-28 52K DALE  
 R-29 12K  
 R-30 27K  
 R-31 15K

R-32 15K  
 R-33 15K  
 R-34 15K

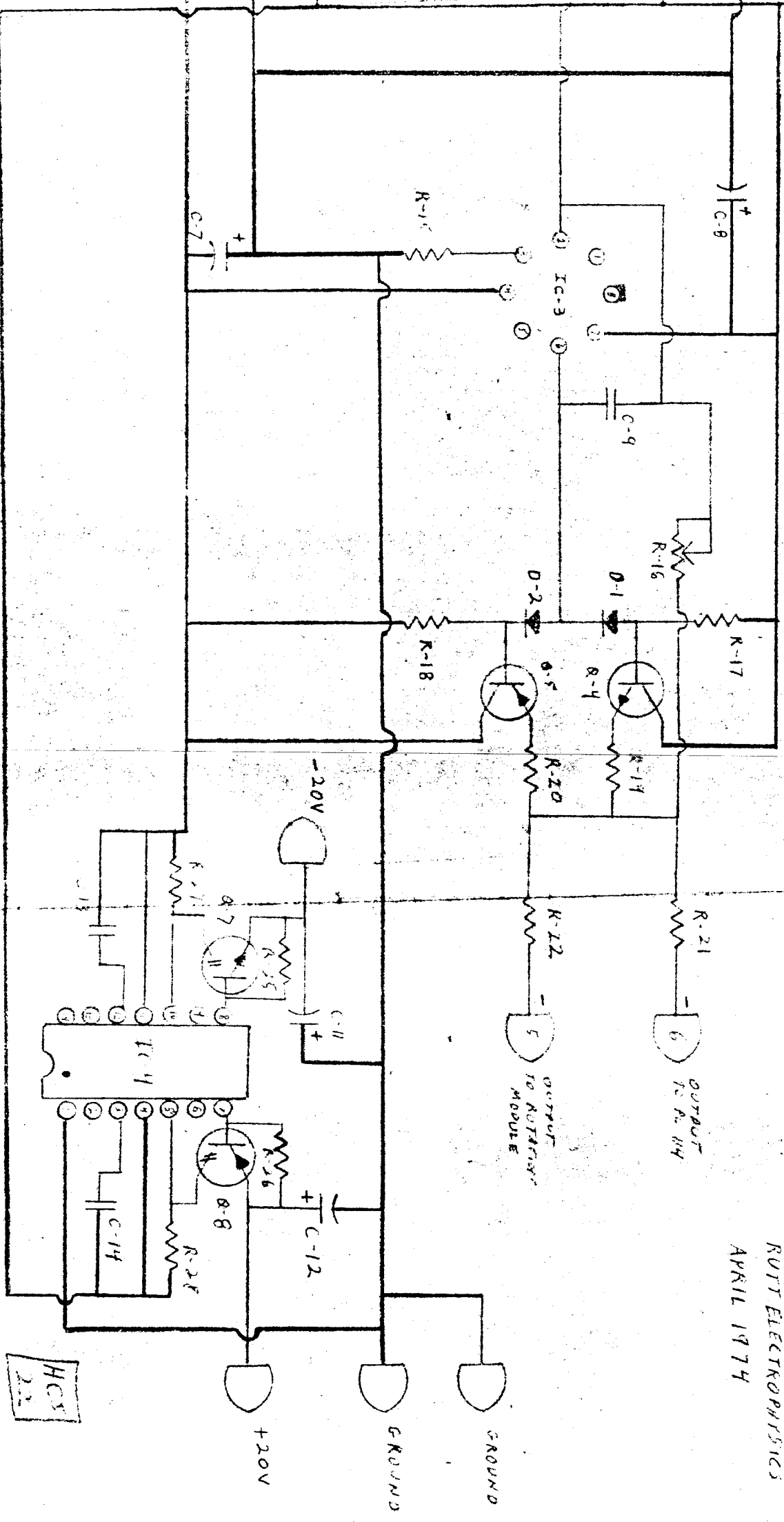
PC-117







5  
6  
0  
0



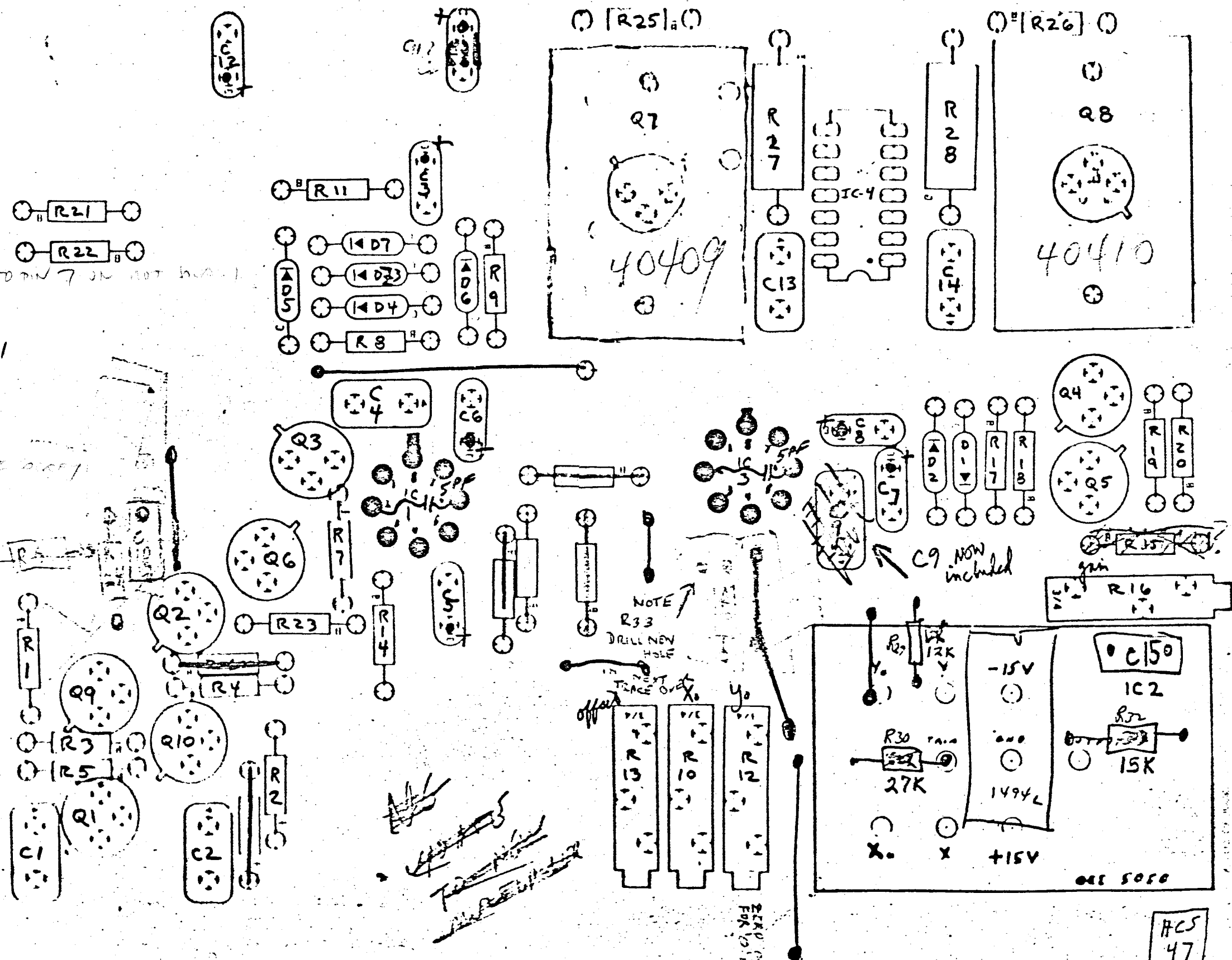
PC-117B  
RUT ELECTROPHYSICS  
APRIL 1974

HCS  
2.2

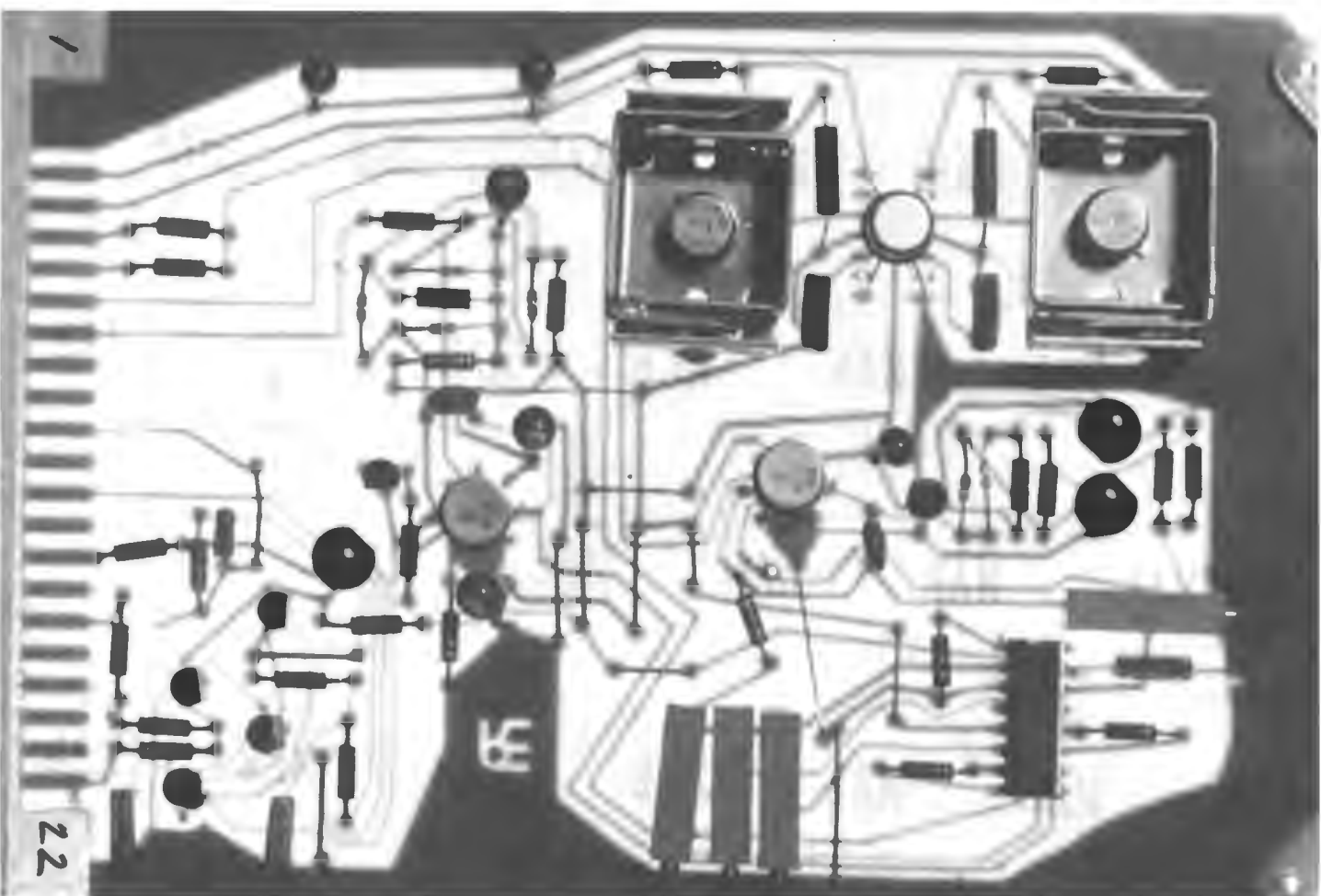
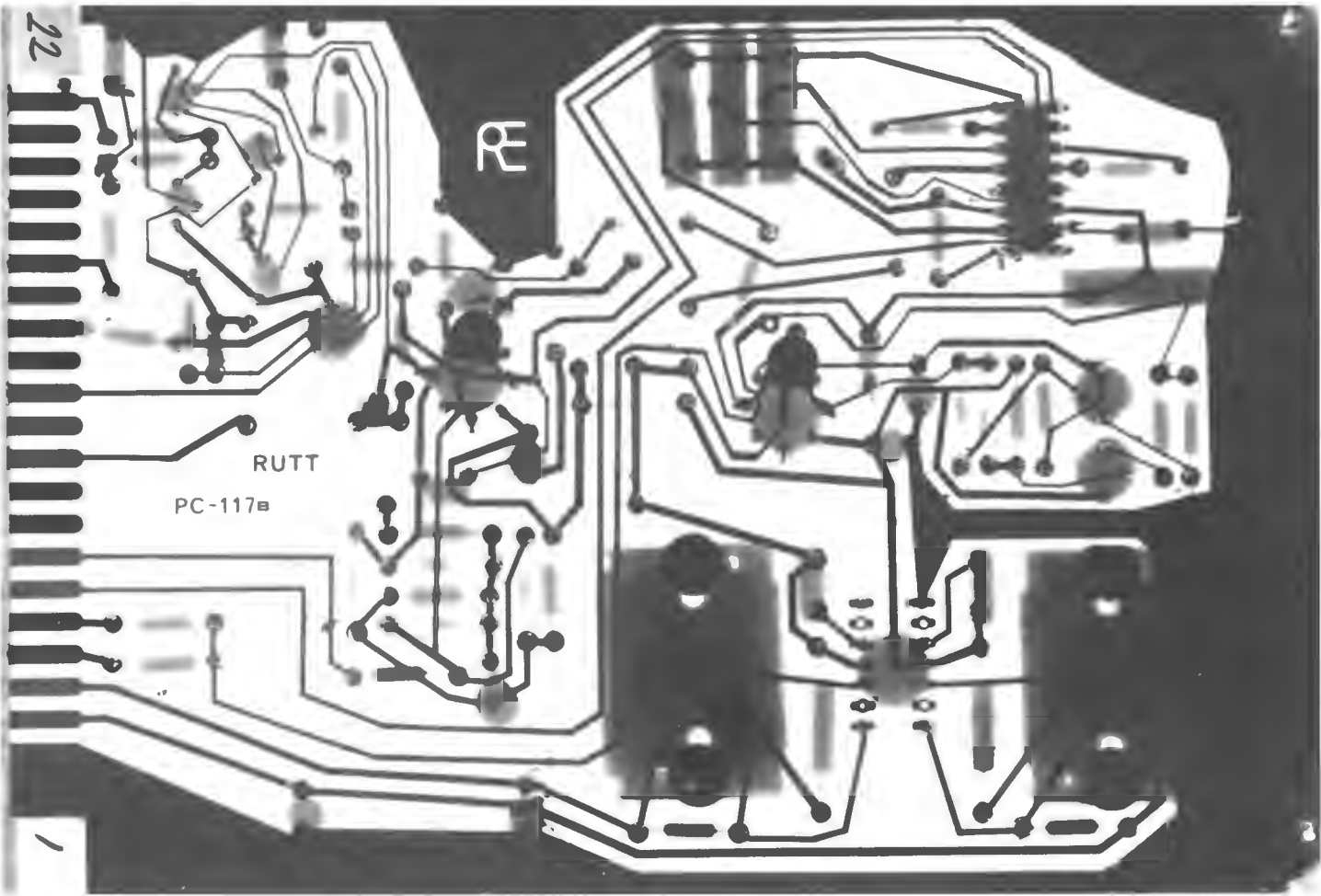
TOP VIEW

- GND 1
- GND 2
- +20V 3
- 20V 4
- OUT PUT TO IN 5
- OUT TO ROT 6
- SWEEP IN 7
- I.C. OUT 8
- 9
- 10
- DUAL TRACE 11
- TO DIN 1 ON R5787 144L MODULE 12
- #2 BIAS 13
- 14
- LEVEL #2 15
- 16
- #1 BIAS 17
- 18
- 19
- 20
- 21
- #1 LEVEL FET 22

Top View



PC 117





# PC-118 AB

IC-1 LM318  
 IC-2 ~~6C199~~ MC199 DIP  
 IC-3 SG-4501

+50 mA  
 -15 mA

A-1 40409  
 A-2 40410  
 A-3 NPN 3509  
 A-4 PNP 3638  
 A-5 FET 205462  
 A-6 FET "  
 A-7 FET "  
 A-8 FET "  
 A-9 NPN 3568

~~IC-4 50R15~~  
 IC-5 50R15

→  
 6.3/35V C-4  
 6.3/35V C-5

→ C-3 5PF  
 C-4 104-254 T44  
 C-5 104-254 T44  
 C-6 154 20V T44  
 C-7 "  
 C-8 "  
 C-9 "  
 C-10 "  
 C-11 14 6-  
 C-12 14 6-  
 C-13 100PF

C14 1 Ceramic  
 C15 1 Ceramic  
 C16 10PF  
 C17 10PF

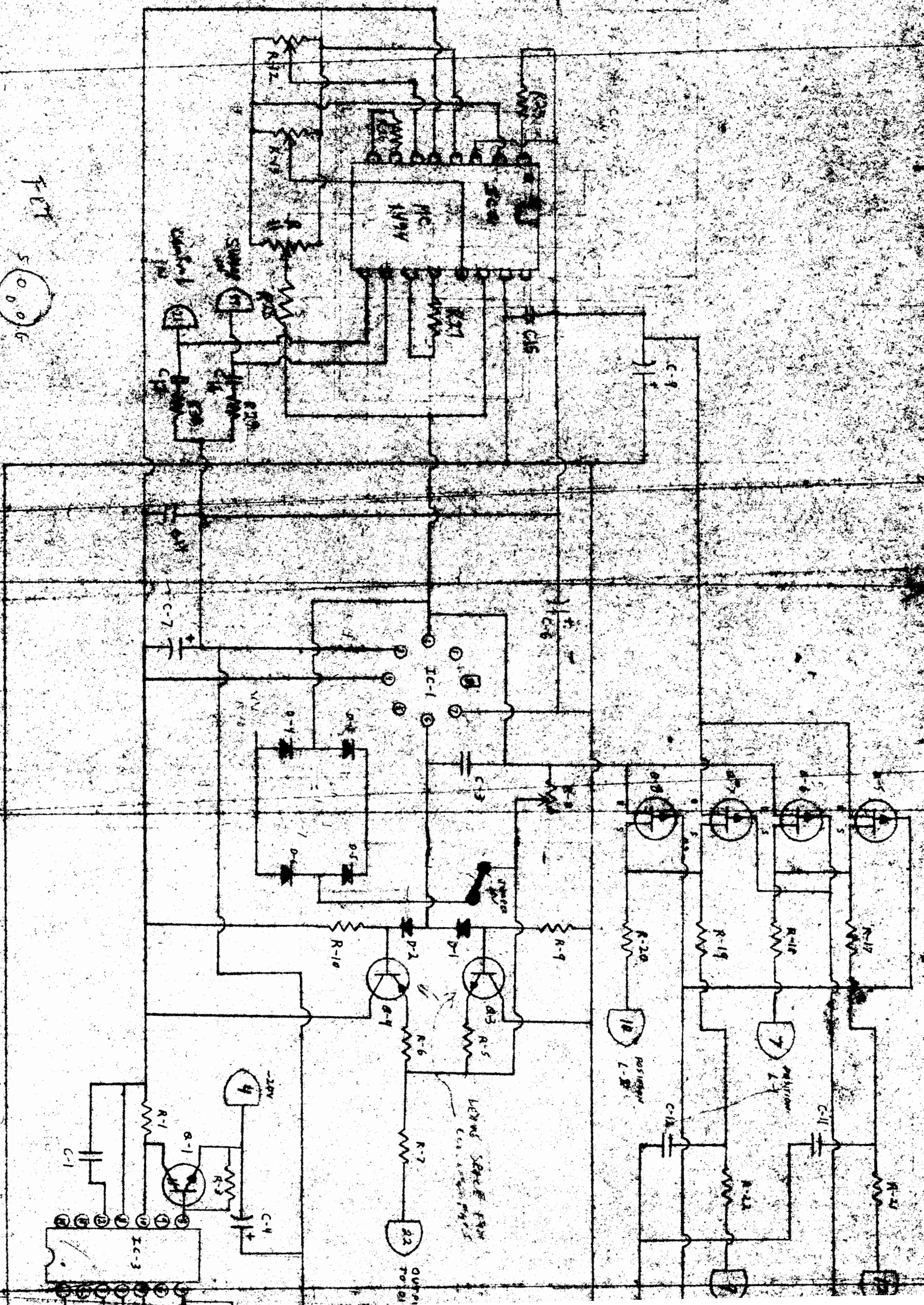
R-1 500 Ohm  
 R-2 500 Ohm  
 R-3 750 -  
 R-4 750 -  
 R-5 4.752  
 R-6 4.752  
 R-7 752 -  
 R-8 100K  
 R-9 10K -  
 R-10 10K -  
 R-11 5K POT (20K)  
 R-12 20K POT  
 R-13 20K POT

R-17 4.7K  
 R-18 4.7K  
 R-19 4.7K  
 R-20 4.7K  
 R-21 560Ω  
 R-22 560Ω  
 R-23 100K  
 R-24 10K  
 R-25 10K

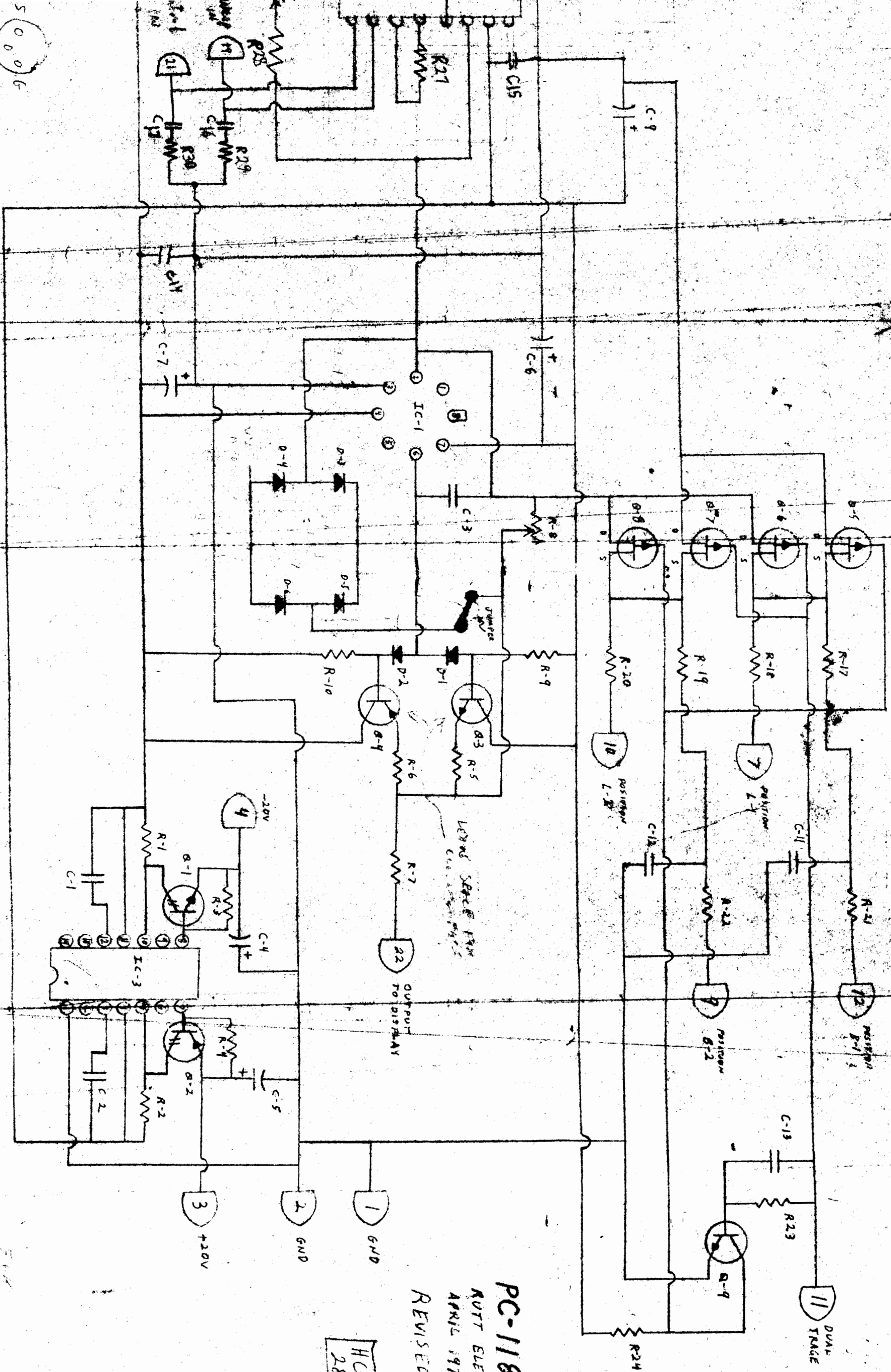
R-26 27K  
 R-27 15K  
 R-28 47K  
 R-29 510Ω  
 R-30 510Ω

D1 112714  
 D2 "  
 D3 "  
 D4 "  
 D5 9-1V Zener  
 D6 9-1V Zener

500.6  
 12.7  
 D







PC-118

RUT ELECTROPHYSICS

APRIL 1974

REVISED TO 118B

HCS  
28

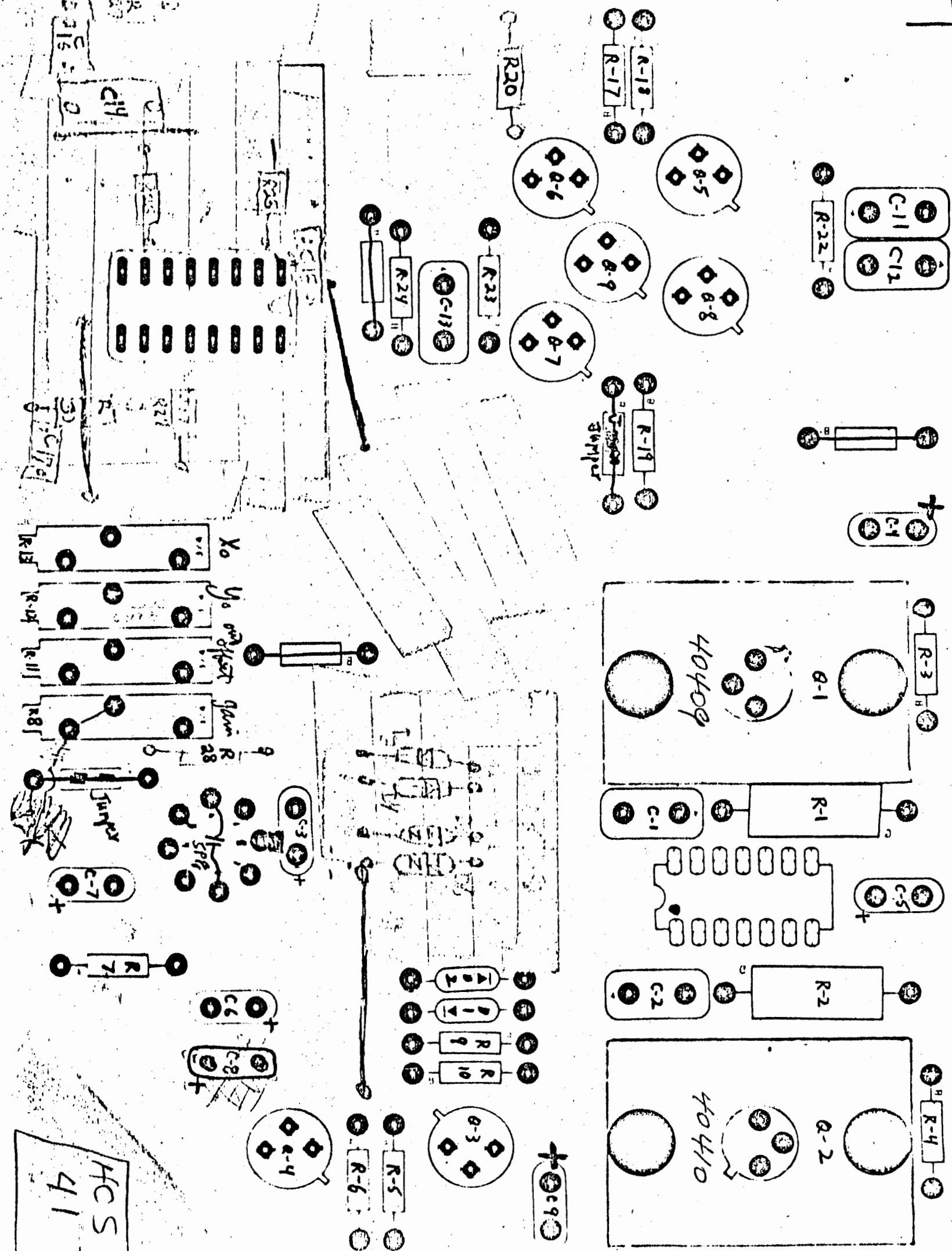
50006

2142

Fe1 for video

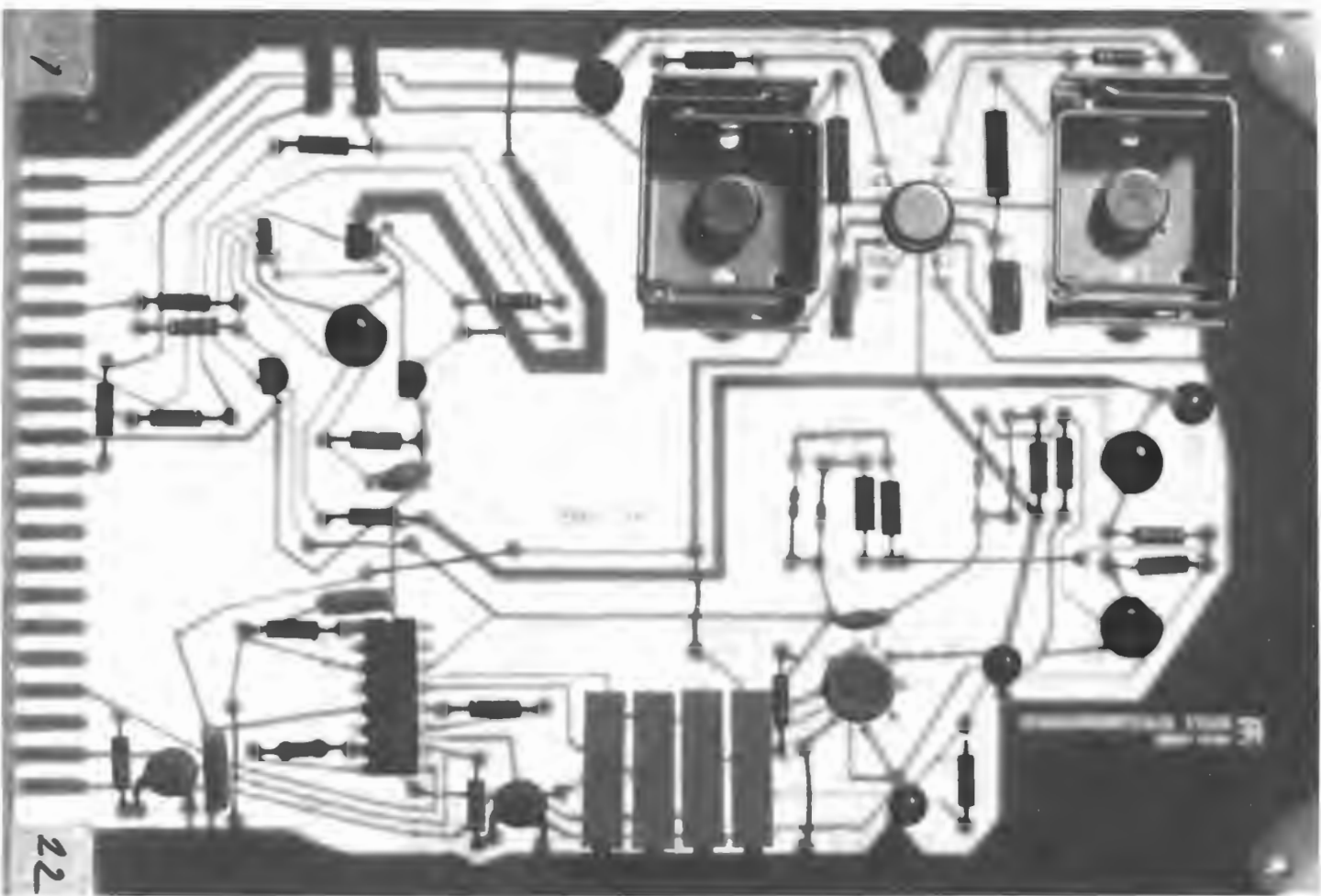
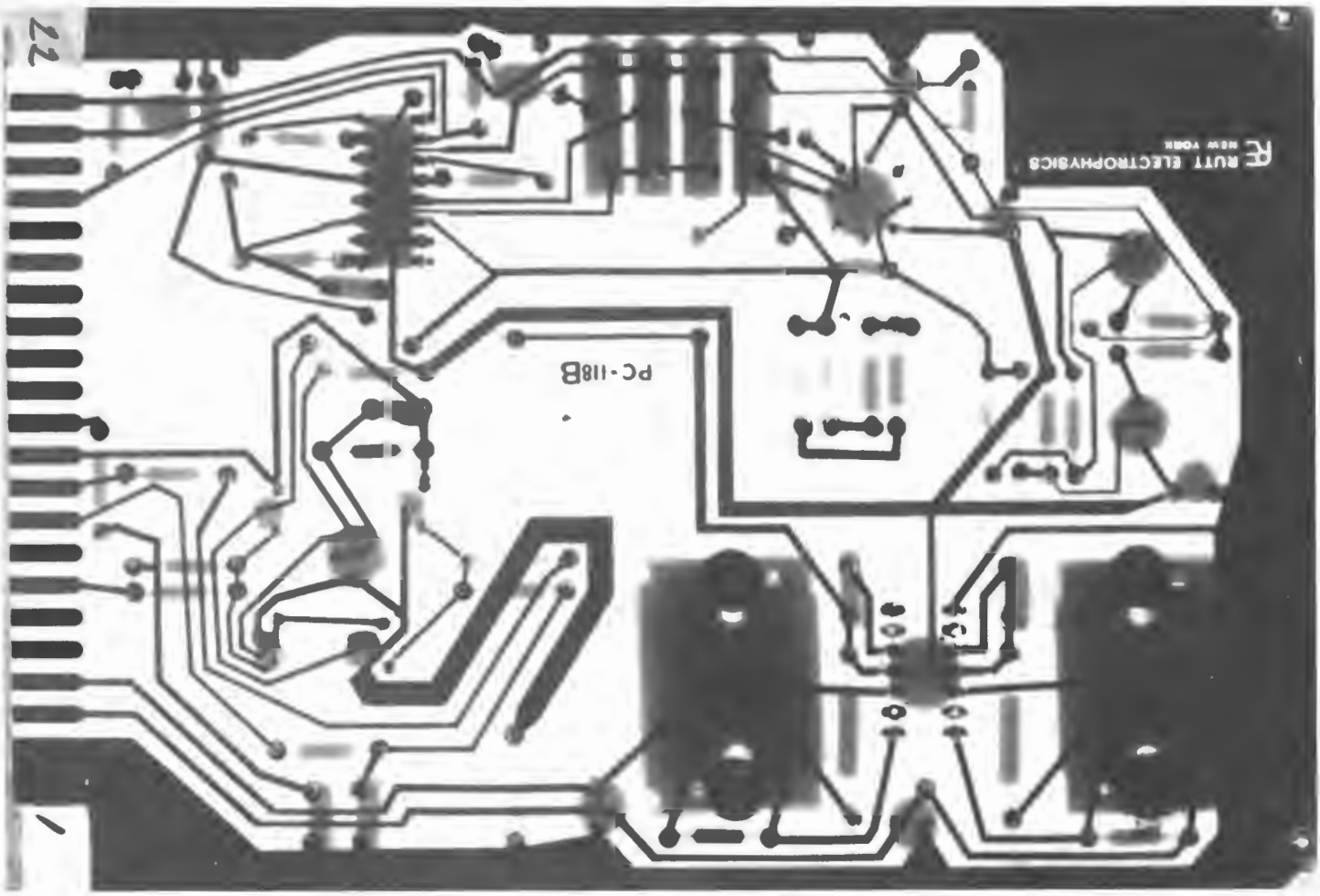
PC-118

- 1 GND
- 2 GND
- 3 +20V
- 4 -20V
- 5
- 6
- 7 L-1 pos
- 8
- 9 B-2 pos
- 10 L-2 pos
- 11
- 12 pos B-1
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22



HCS  
41





( 1 2 2 )

# VIDEO DRIVER ±15V POWER SUPPLY

Q-9 40409

Q-10 40410

IC-11 SG4501

C-30 .01 CER

C-31 .01 CER

C-32 6.84 35V TANT

C-33 6.84 35V TANT

R-62 DATE

R-63 DATE

R 64 75R

R 65 75R

C-34

6.84 35V TANT

C-35

24 OVER 300V CER.

C-29

.014 50V

R 66 20K TRIM

(GRID 1)

R 67 4.7K

C-36

.014 (1KV) DISC

C-37

" "

C-38

" "

C-39

" "

## CONNECTIONS

CRT	0	0	0	0	0	0
0 FIL (HRT)	0 FIL (GND)	0 GRID 1	0 GRID 2	0 CATHODE		

VIDEO IN

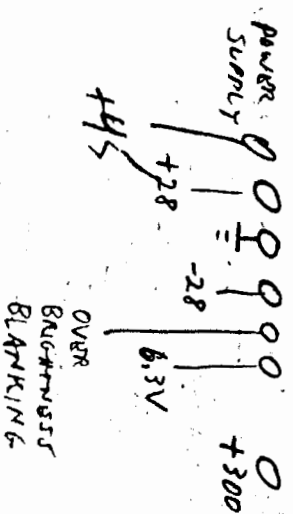
0 GND

0 VIDEO IN

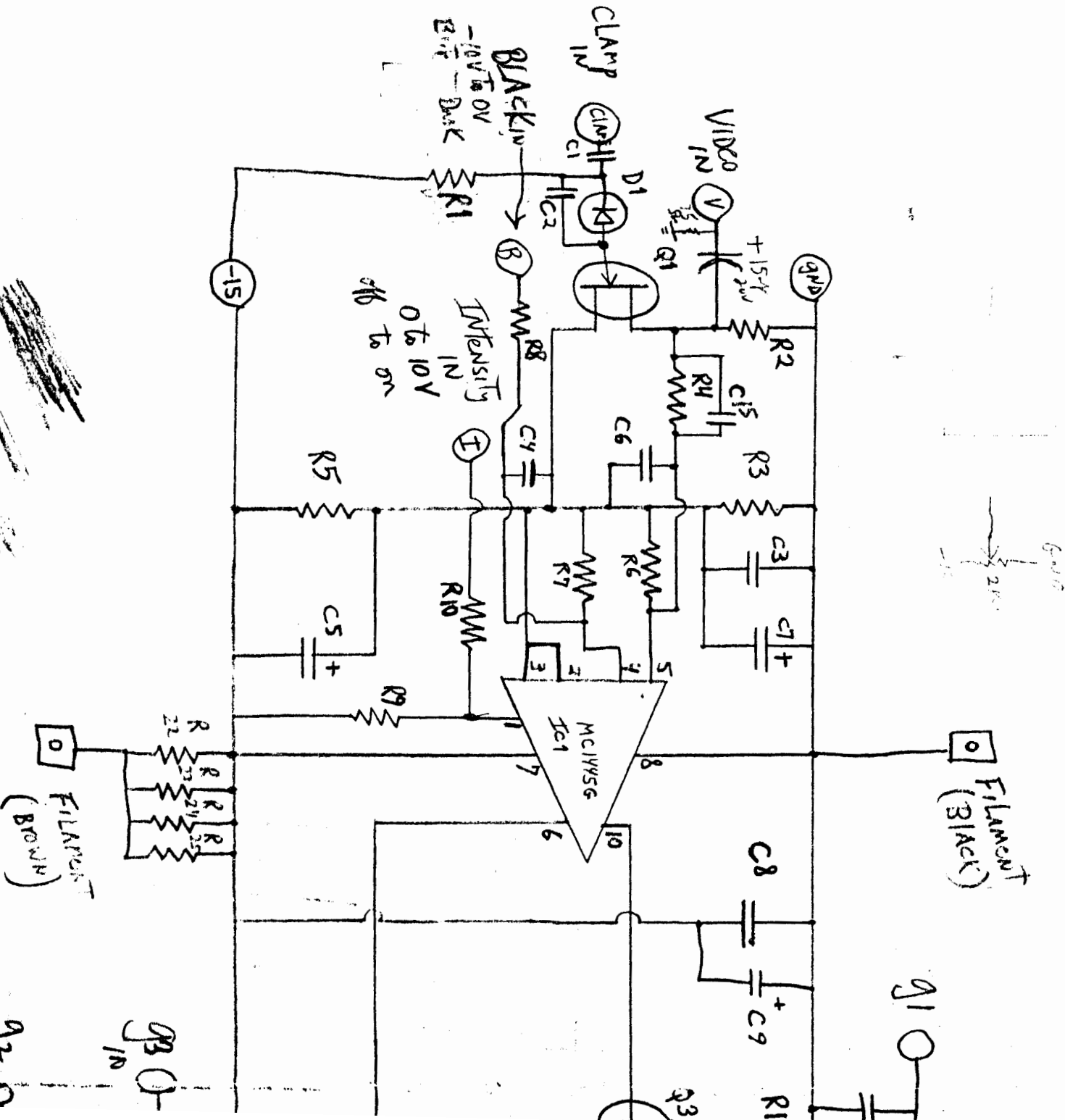
DCU	0	0	0	0	0	0
GND	0	0	0	0	0	0
Blank						

EDGE

BLANK

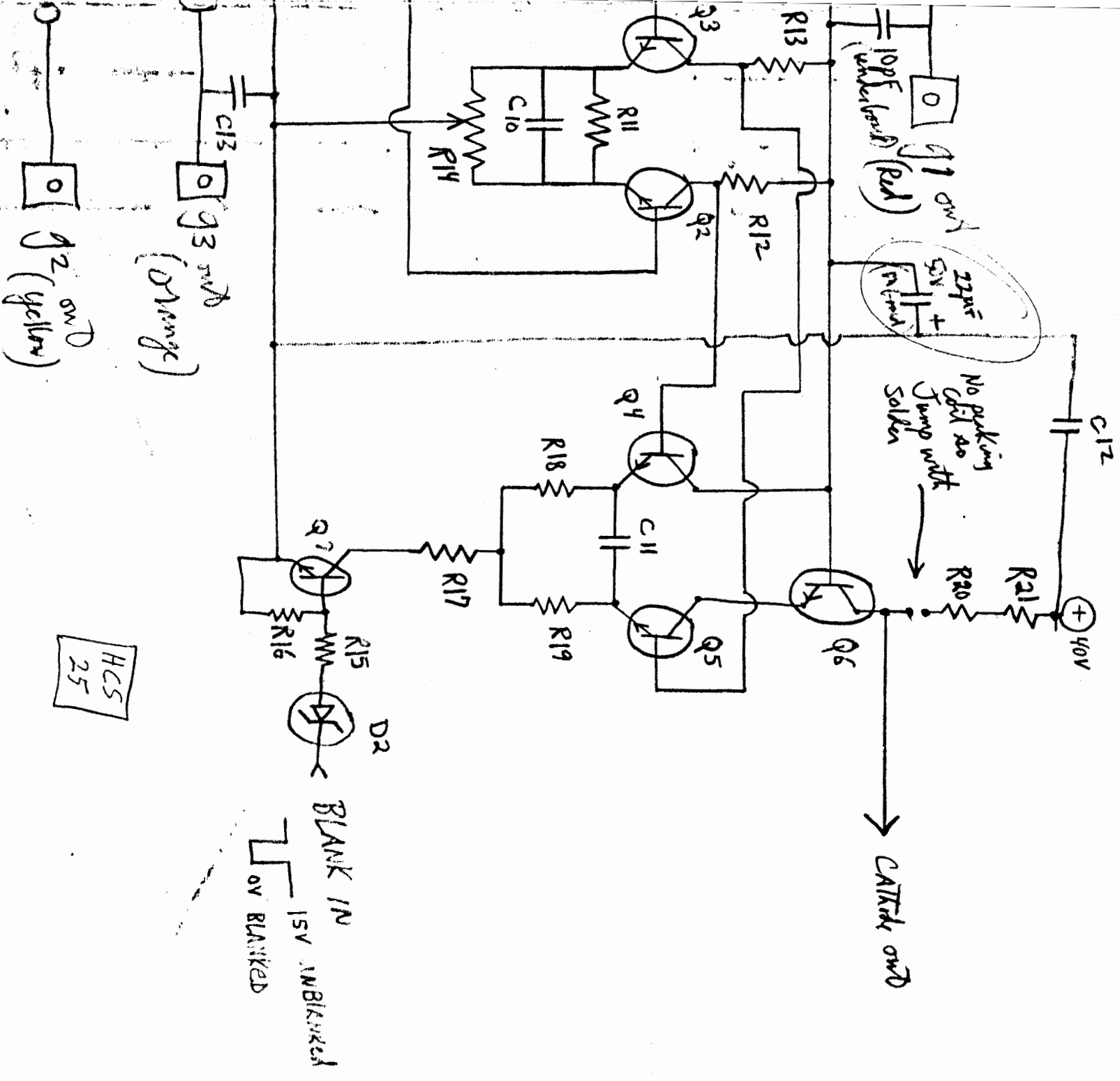


Video



# CRT DRIVER

PC 119





## PC 119 Parts List - Video CRT Driver

### Transistors

Q1 - 2N4091  
Q2 - 2N5770, or MPS 6543, Hep56  
Q3 - or Hep 720  
Q4 - strap pairs together  
Q5 - for thermal contact  
Q6 - 2N2219A  
Q7 - MPS 5172

### Integrated Circuits

IC1 - MC 1445 G (or MC1545G is OK but  
expensive...) Use Heat SINK

Part List

PC 119

Video CRT Driver \*

D<sub>1</sub> 1N914  
D<sub>2</sub> 1N5218 (18V Zener)  
Q<sub>1</sub> 2N4091

IC1 MC1455G  
(1545G is OK also)  
but expensive

Q<sub>2</sub> 2N5170  
Q<sub>3</sub> MPS 6543, Hep 56, Transistor  
Q<sub>4</sub> 2N2219A  
Q<sub>5</sub> MPS 5172 Transistor  
Q<sub>6</sub> 47K — all 1/4 watt 50p

R<sub>1</sub> 47K — all 1/4 watt 50p  
R<sub>2</sub> 75Ω  
R<sub>3</sub> 270Ω  
R<sub>4</sub> 180Ω  
R<sub>5</sub> 1K  
R<sub>6</sub> 1K  
R<sub>7</sub> 470K — use 2-1Meg in parallel if you don't have  
R<sub>8</sub> 3-3K (3.6K is mod as good)  
R<sub>9</sub> 4.7K (use 6.8K if R<sub>9</sub>=3.6K)  
R<sub>10</sub> 51Ω  
R<sub>11</sub> 470Ω  
R<sub>12</sub> 470Ω  
R<sub>13</sub> 2K pot  
R<sub>14</sub> 1K  
R<sub>15</sub> 1K  
R<sub>16</sub> 1K  
R<sub>17</sub> 180Ω  
R<sub>18</sub> 51Ω  
R<sub>19</sub> 51Ω  
R<sub>20</sub> 510Ω  
R<sub>21</sub> 510Ω  
R<sub>22</sub> 27  
R<sub>23</sub> 24  
R<sub>24</sub> 25

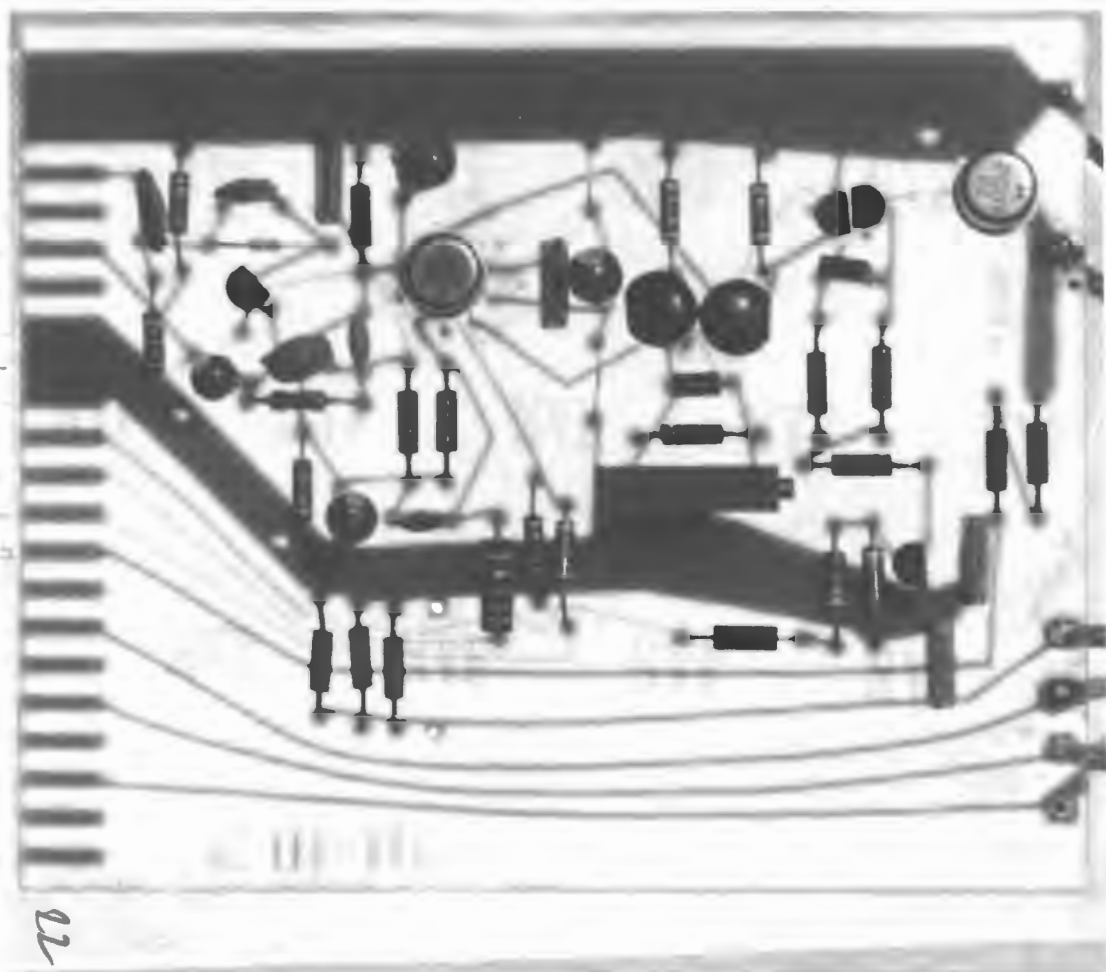
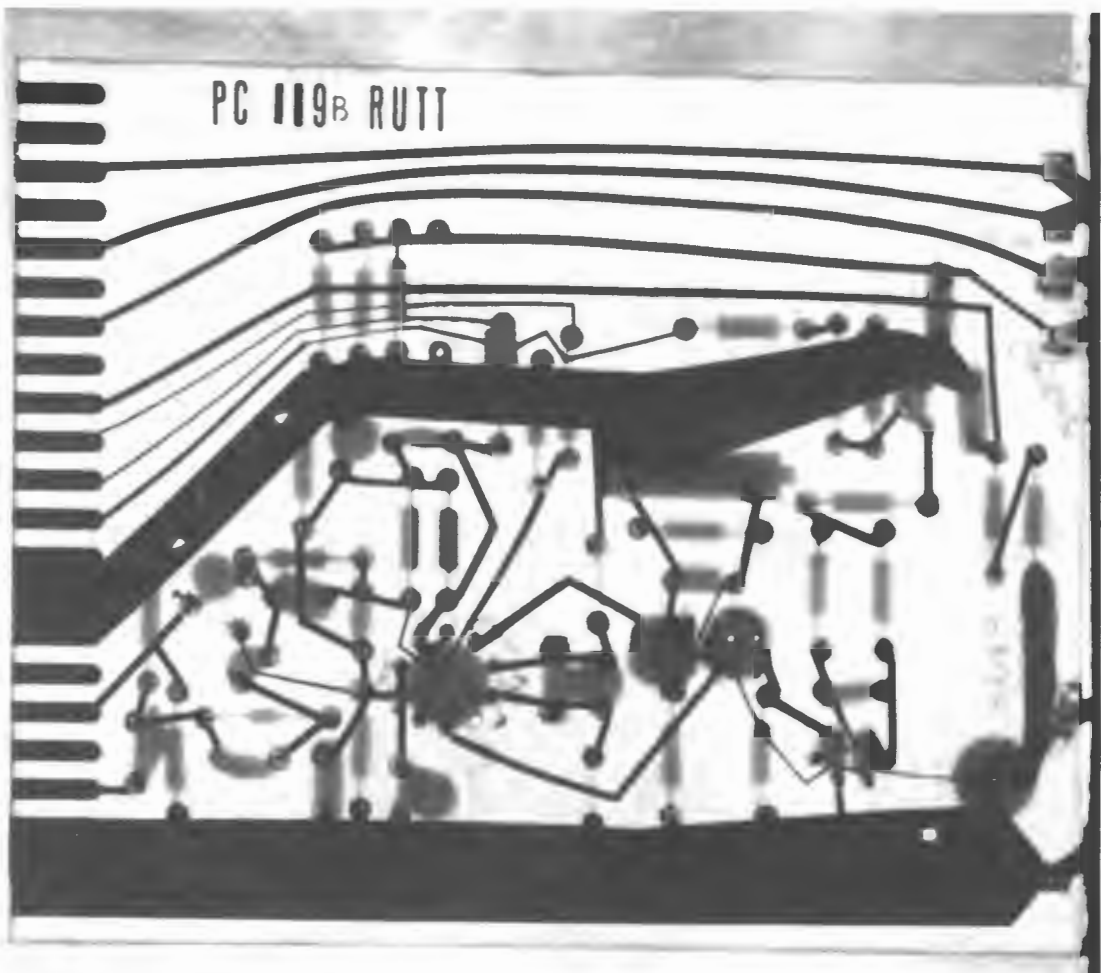
C<sub>1</sub> .001  
C<sub>2</sub> 10 pF  
C<sub>3</sub> .1 ceramic  
C<sub>4</sub> 33 pF  
C<sub>5</sub> 15 pF/20V  
C<sub>6</sub> 33 pF  
C<sub>7</sub> 15 pF/20V  
C<sub>8</sub> .1 ceramic  
C<sub>9</sub> 15 pF/20V  
C<sub>10</sub> 100 pF \*  
C<sub>11</sub> 100 pF \*  
C<sub>12</sub> .1 pF ceramic  
C<sub>13</sub> .1 pF ceramic  
C<sub>14</sub> 15 pF/20V  
C<sub>15</sub> 100 pF \*  
C<sub>16</sub> 100 pF \*

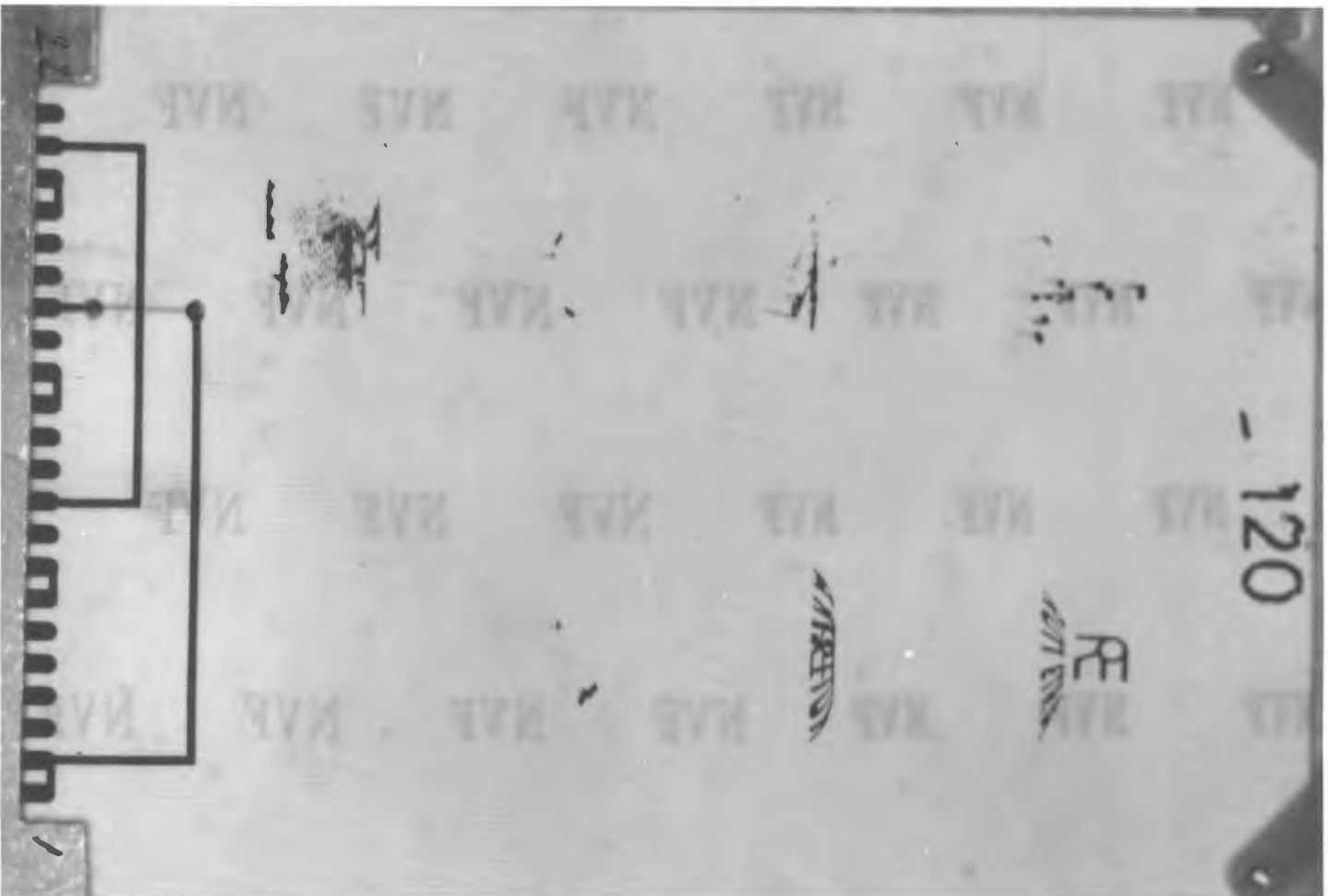


\* These parts are fine for  
NON-30 MHz use

for broadcast use, C<sub>10</sub>, C<sub>11</sub>  
and C<sub>15</sub> are  
critical and need adjustment  
for each brand

HCS  
37







PC-121

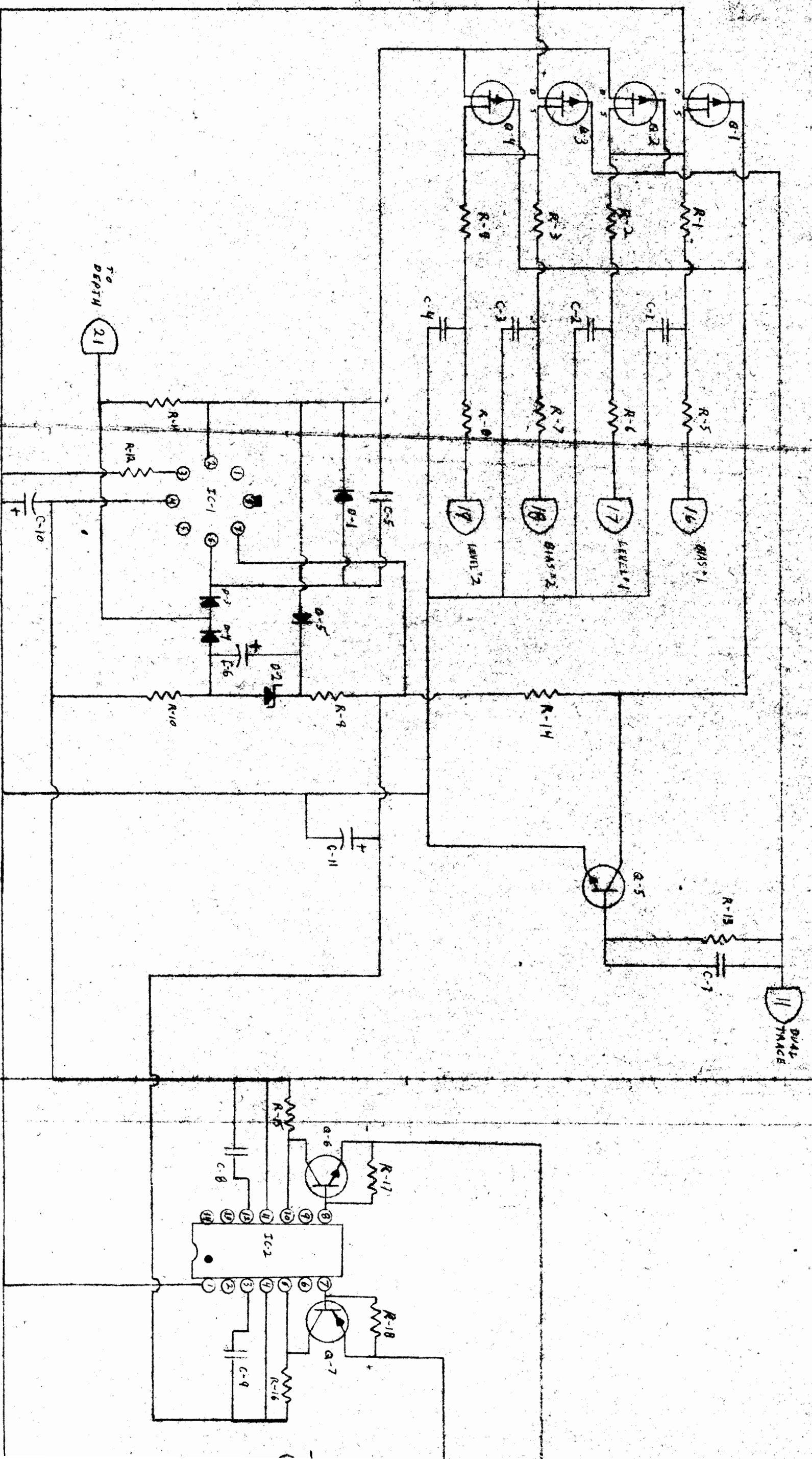
Q1	FET 3462	4	C-1	.1 $\mu$ -	R-1	8.2K -
Q-2	FET "	4	C-2	.1 $\mu$ -	R-2	8.2K -
Q-3	FET "	4	C-3	.1 $\mu$ -	R-3	8.2K -
Q-4	FET "	4	C-4	.1 $\mu$ -	R-4	8.2K -
Q-5	NPN	3	C-5	5PF -	R-5	1K -
Q-6	NPN - 2N3550	4	C-6	154 20V -	R-6	1K -
Q-7	PNP - 100 4040	4	C-7	100PF -	R-7	1K -
	2N 3550	4	C-8	.1 $\mu$ -	R-8	1K -
		4	C-9	.1 $\mu$ -	R-9	15K -
Q-8	40409	3	C-10	154 20V	R-10	15K -
Q-9	40410	3	C-11	154 20V	R-11	20K -
		4	C-12	.1 $\mu$ -	R-12	4.7K -
		4	C-13	.1 $\mu$ -	R-13	100K -
		3	C-14	154 20V	R-14	10K -
		3	C-15	154 20V	R-15	500 OHM -
		3	C-16	104 25V	R-16	500 OHM -
		3	C-17	104 25V	R-17	750 -
					R-18	750 -
					R-19	750 -
					R-20	750 -
					R-21	.5 Dale -
					R-22	.5 " -
					R-23	50K Pot (50K)

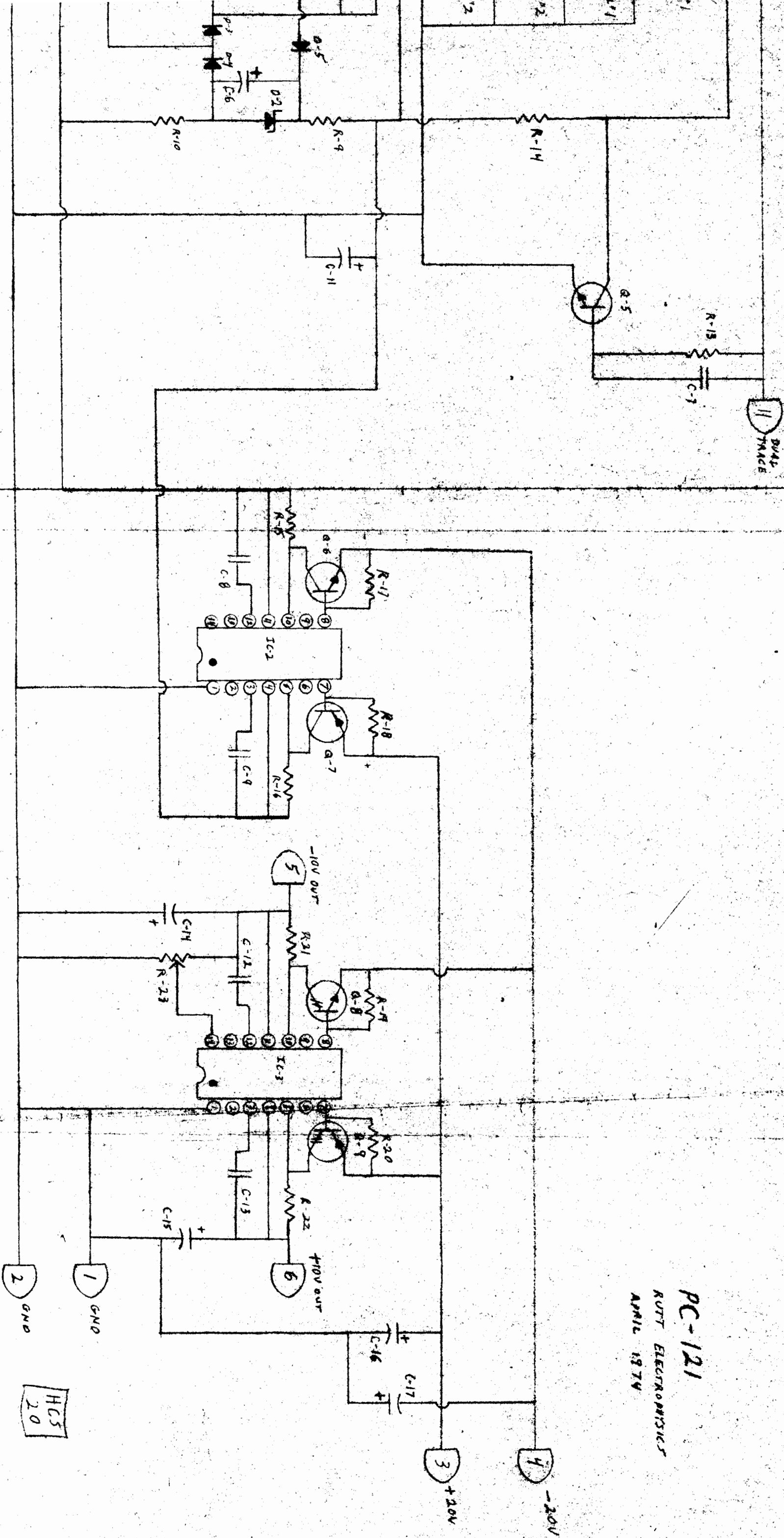
UNDER  
BOARD

R23  $\pm 10$  VOLT ADJUST  
pin 6  $\rightarrow$  +10  
C  $\rightarrow$  INCREASE

- D-1 1N914
- D-2 9.1V ZENER
- D-3 1N914
- D-4 "
- D-5 "

#25  
65





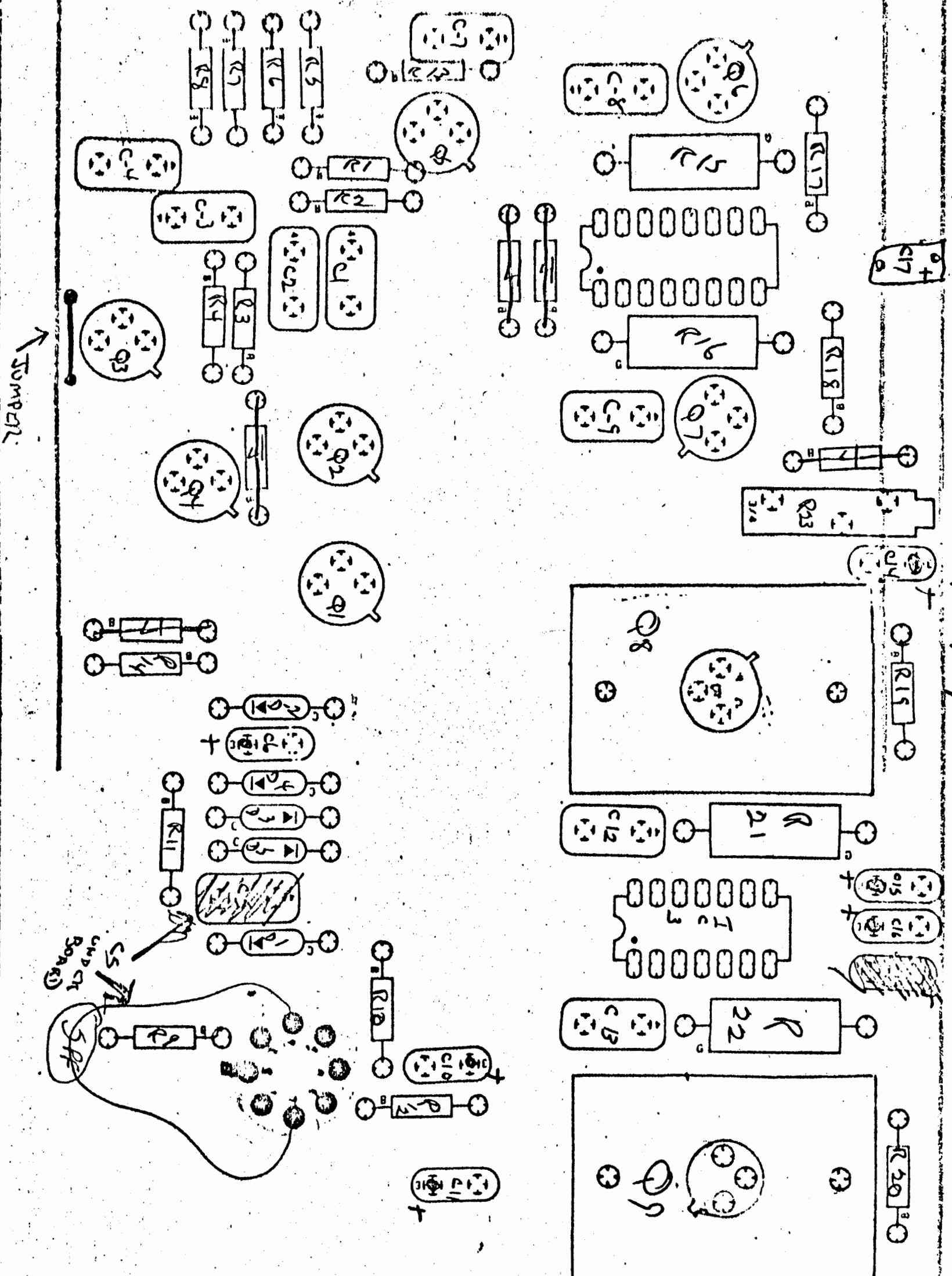
PC-121

RUTT ELECTROPHYSICS  
APRIL 1974

HCS  
20

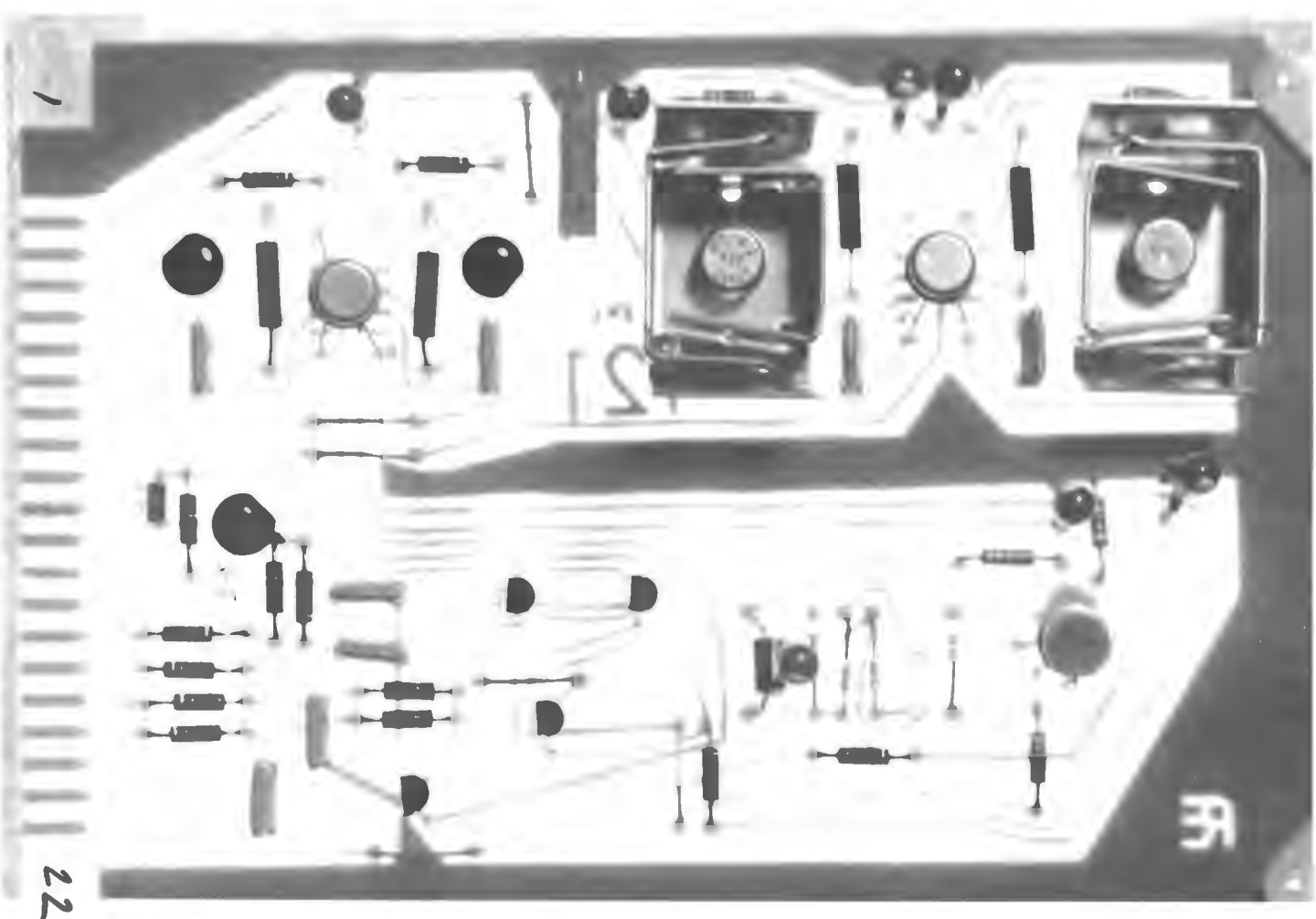
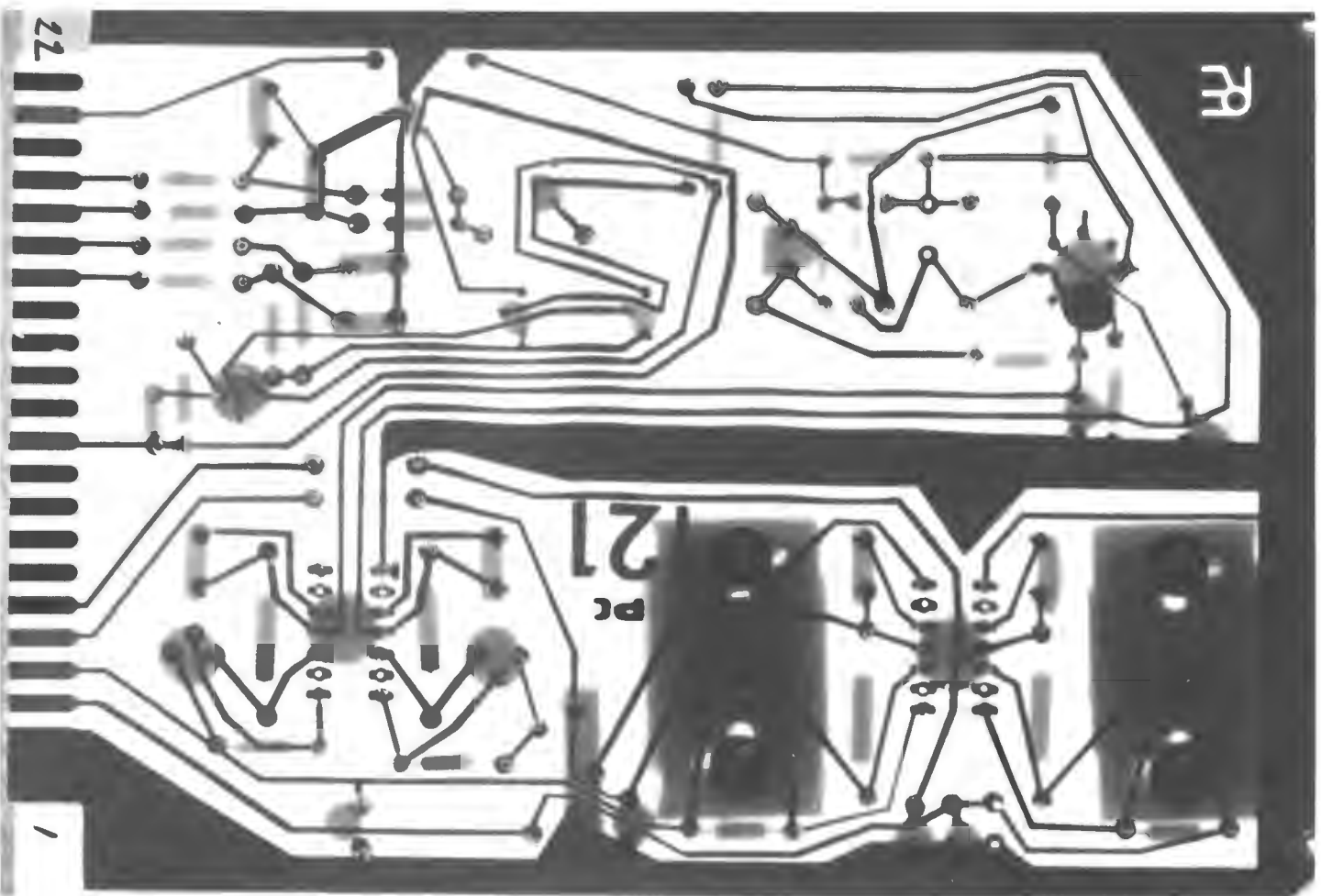
PC-121

- 640 1
- 640 2
- +20 3
- 20 4
- 10 5
- +10 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20



HC5  
54





PC-122

Q-1 FET  
Q-2 FET  
Q-3 FET  
Q-4 FET  
Q-5 NPN  
Q-6 NPN  
Q-7 PNP  
Q-8 NPN  
Q-9 PNP

IC-1 LM318 OP-AMP  
IC-2 564561 RECTIFIER  
IC-3 LM318 OP-AMP

D-1 1N914 ✓  
D-2 9.1V Zener 1N5239B  
D-3 1N914 ✓  
D-4 " ✓  
D-5 " ✓  
D-6 " ✓  
D-7 " ✓

C-1 .1u ✓  
C-2 .1u ✓  
C-3 .1u ✓  
C-4 .1u ✓  
C-5 5PF ✓  
C-6 15420V ✓  
C-7 100PF ✓  
C-8 .1u ✓  
C-9 .1u ✓  
C-10 15420V ✓  
C-11 15420V ✓  
C-12 5PF ✓  
R-1 2.2K (4.1K) ✓  
R-2 10K ✓  
R-3 8.2K 4.1M ✓  
R-4 10K ✓  
R-5 1K ✓  
R-6 4.7K ✓  
R-7 1K ✓  
R-8 10K ✓  
R-9 15K ✓  
R-10 15K ✓  
R-11 20K ✓  
R-12 4.7K ✓  
R-13 10K ✓  
R-14 10K ✓  
R-15 .52 5K ✓  
R-16 .52 5K ✓  
R-17 752 ✓  
R-18 752 ✓  
R-19 10K ✓  
R-20 10K ✓  
R-21 102 ✓  
R-22 102 ✓  
R-23 752 ✓  
R-24 10K ✓

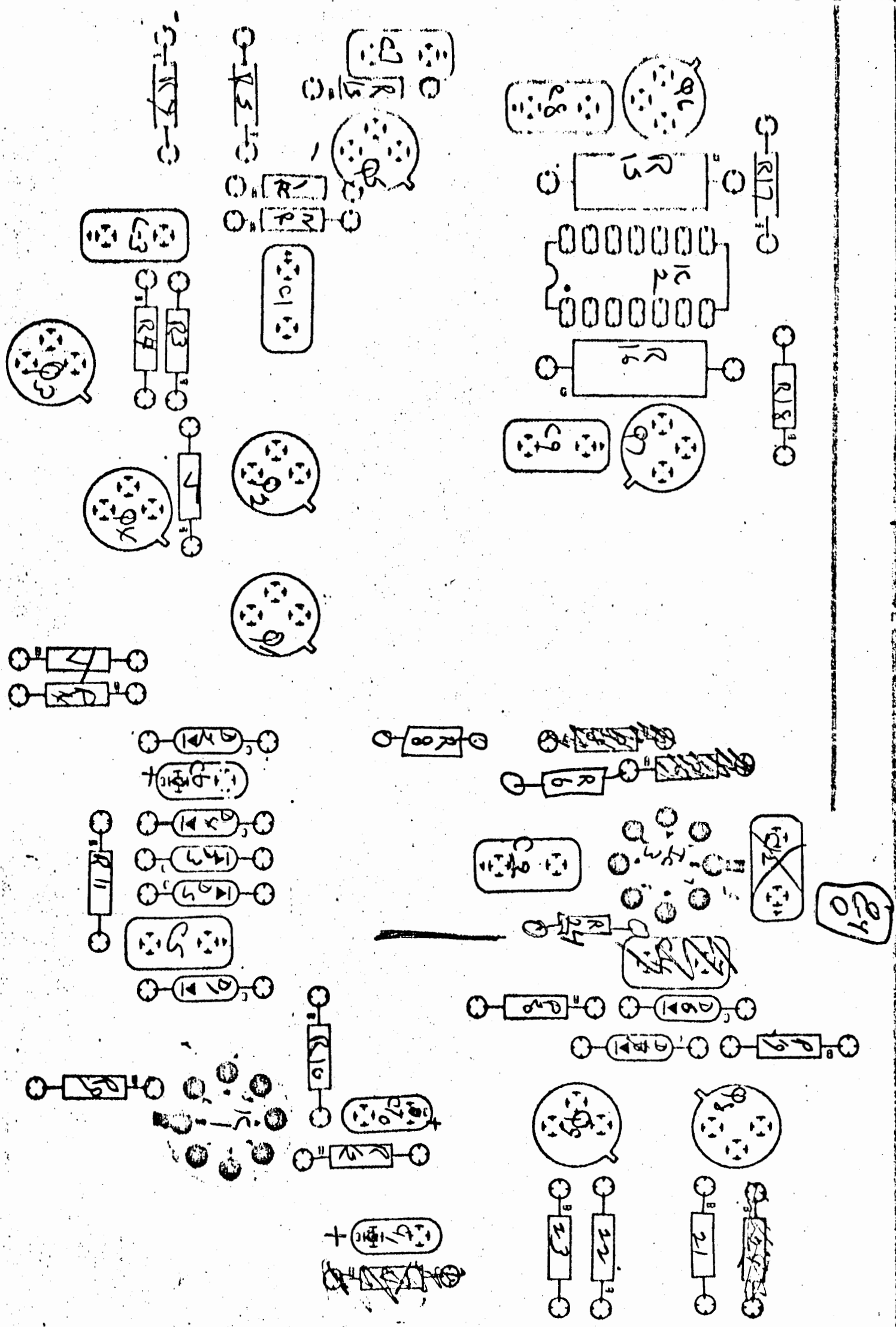
UNOER BOARD

HCS 36

Chassis C-204

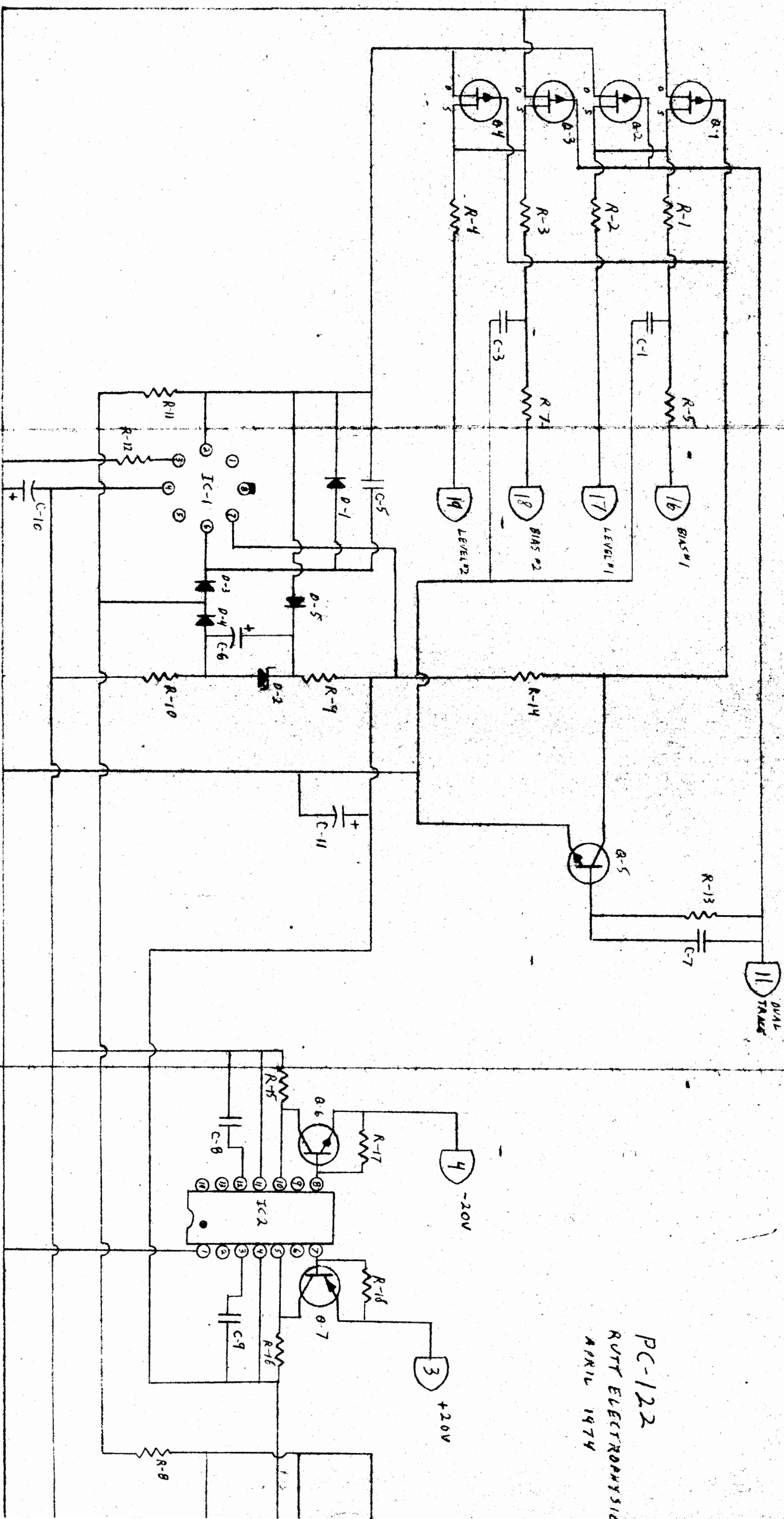
Chassis R 6, 8, 12

PC-122



OK. J. J. J.

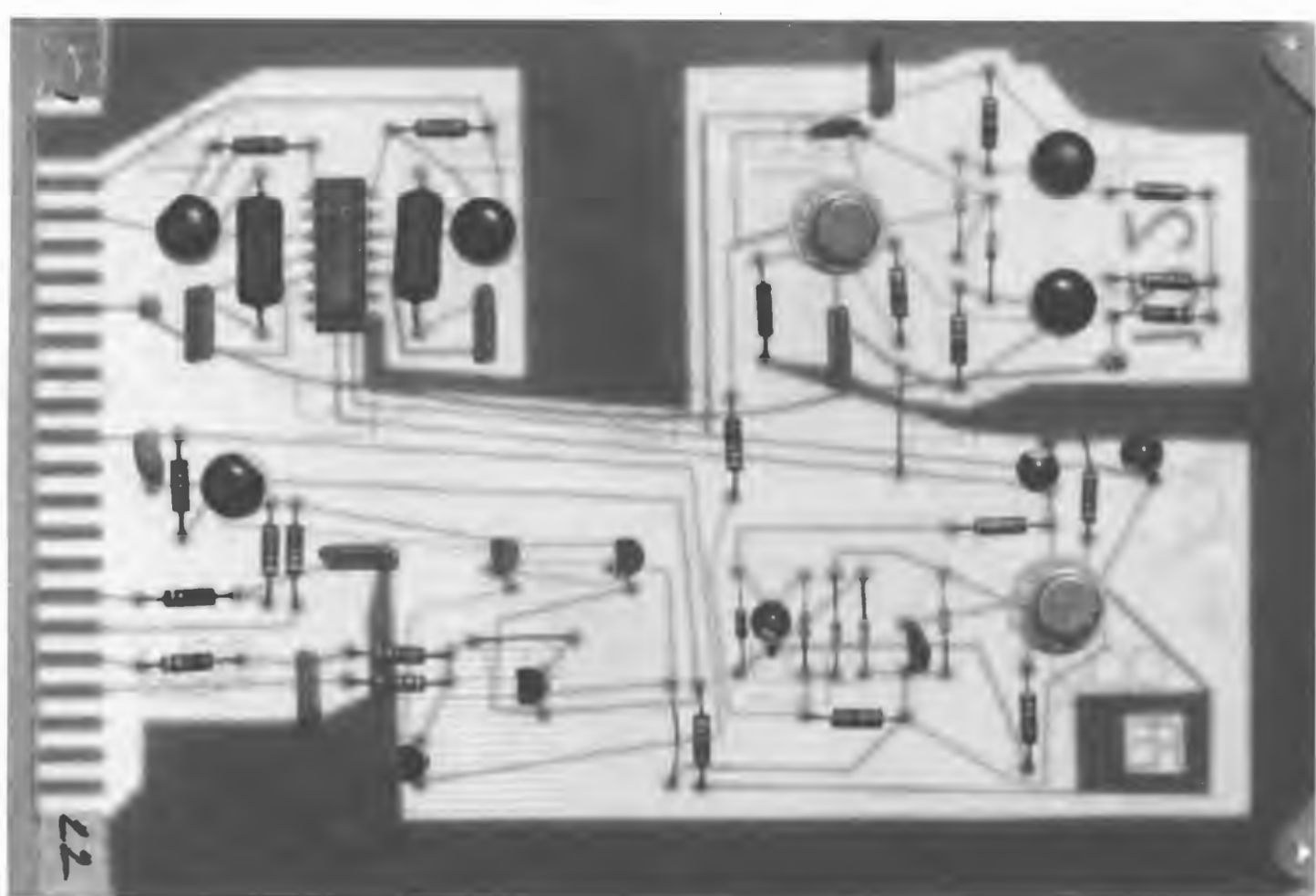
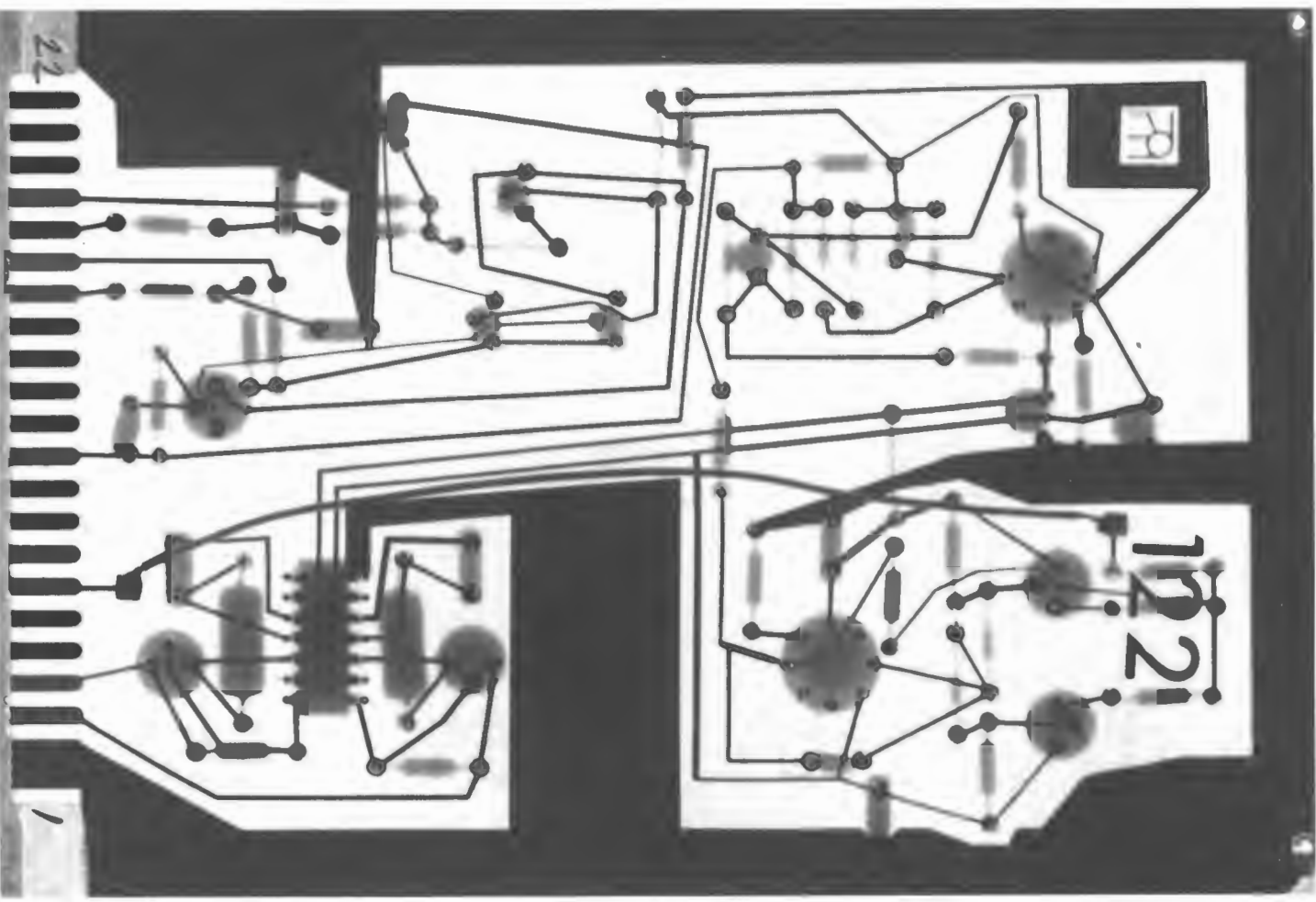
HC-49



PC-122  
RVT ELECTROPHYSIC  
APRIL 1974







# Minimum screen dimensions (projected)

Diagonal .....	4.921" (127.3 mm)
Width .....	4.291" (109.9 mm)
Height .....	3.267" (84.9 mm)
Weight (Approx.) .....	0.5 kg
Operating Position .....	Any
Anode cap .....	Small Cavity

(J1-21)

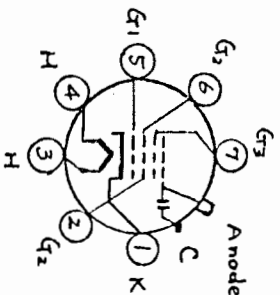
Base ..... Small-Button

Special miniature

7 pin (E7-91)

Basing .....

## Bottom view



Cap-Anode (Grid No.4  
screen collector)

C-External conductive  
coating

## GRID-DRIVE SERVICE

Unless otherwise specified, voltage values are positive with respect to cathode.

## MAXIMUM AND MINIMUM RATINGS (Design-Maximum Values)

Anode Voltage .....	{ 10000 max volts 7000 min volts
Grid-No.3 (Focusing) Voltage:	
Positive value .....	1100 max volts
Negative value .....	550 max volts
Grid-No.2 Voltage .....	{ 550 max volts 250 min volts
Grid-No.1 Voltage:	
Negative-bias value .....	125 max volts
Positive-bias value .....	0 max volts
Positive-peak value .....	2 max volts
Heater voltage .....	{ 13.9 max volts 11.3 min volts
Peak Heater-Cathode Voltage 1)	130 max volts
Combined AC & DC Voltage .....	80 max volts
DC Component .....	

### EQUIPMENT DESIGN RANGES

Grid-No.3 Current .....	-25 to +25 $\mu$ A
Grid-No.2 Current .....	-15 to +15 $\mu$ A
Field Strength of Adjustable Centering magnet 2) .....	0 to 10 gauss

### TYPICAL OPERATING CONDITIONS

Anode Voltage .....	8000 volts
Grid-No.2 Voltage .....	400 volts
Grid-No.3 Voltage for focus 3) .....	0 to 400 volts
Grid-No.1 Voltage for visual extinction of focused raster .....	-22 to -46 volts

### MAXIMUM CIRCUIT VALUES

Grid-No.1 Circuit Resistance .....	1.5 max. megohms
------------------------------------	------------------

### CATHODE-DRIVE SERVICE

Unless otherwise specified, voltage values are positive with respect to Grid-No.1

### MAXIMUM AND MINIMUM RATINGS (Design-Maximum Values)

Anode Voltage .....	10000 max volts 7000 min volts
Grid-No.3 (Focusing) Voltage:	
Positive value .....	1100 max volts
Negative value .....	550 max volts
Grid-No.2 Voltage .....	{ 550 max volts 250 min volts
Cathode Voltage:	
Positive-bias value .....	125 max volts
Negative-bias value .....	0 max volts
Negative-peak value .....	2 max volts
Heater voltage .....	{ 13.9 max volts 11.3 min volts
Peak Heater-Cathode Voltage 1)	
Combined AC & DC Voltage .....	130 max volts
DC Component .....	80 max volts



### EQUIPMENT DESIGN RANGES

Grid-No.3 Current .....	-25 to +25 $\mu$ A
Grid-No.2 Current .....	-15 to +15 $\mu$ A
Field Strength of Adjustable Centering magnet 2) .....	0 to 10 Gaussess

### TYPICAL OPERATING CONDITIONS

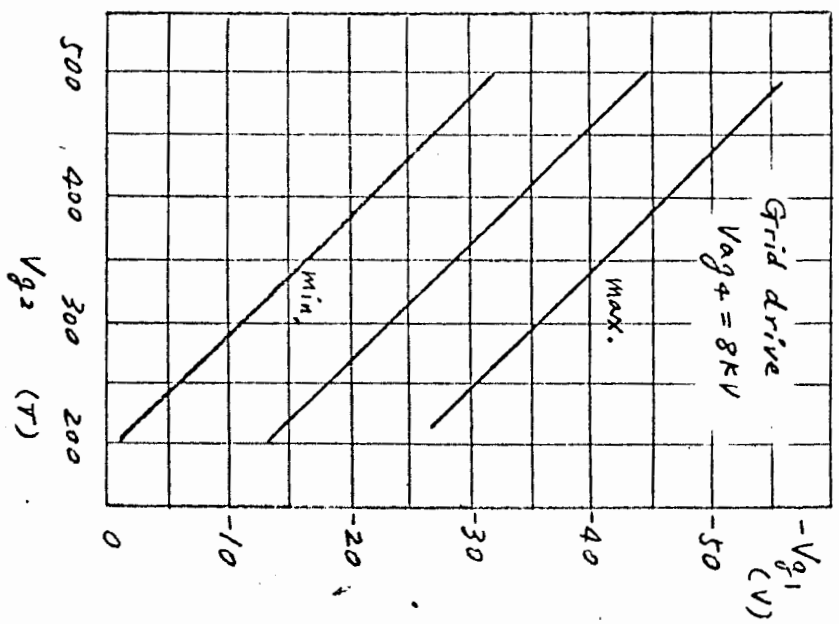
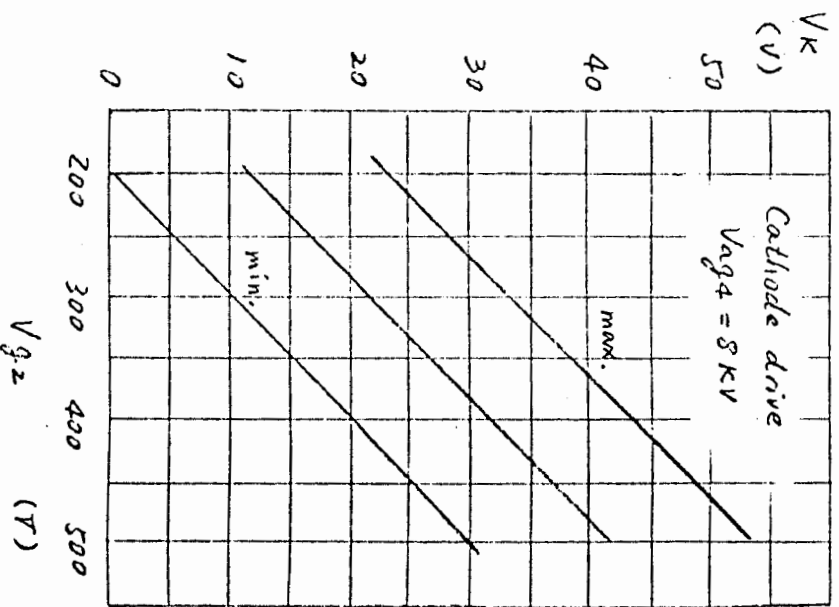
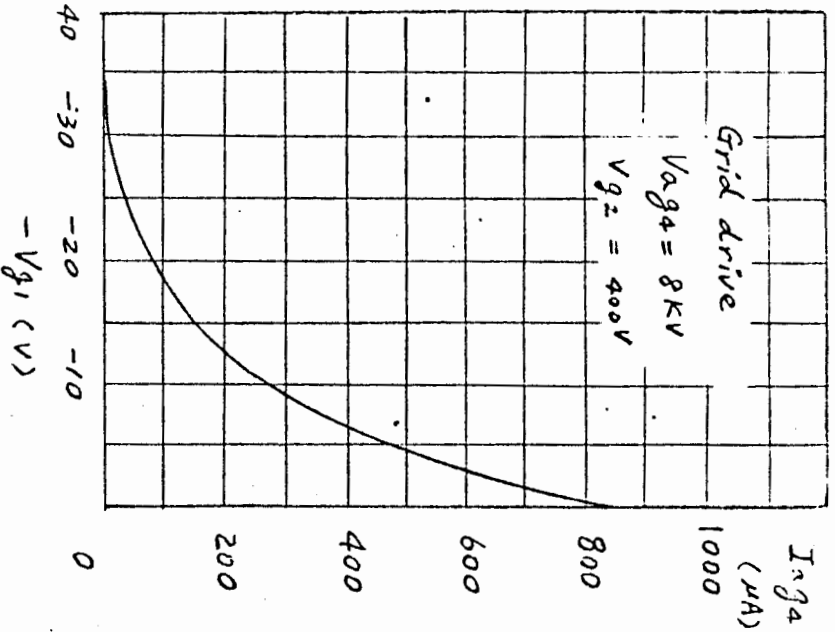
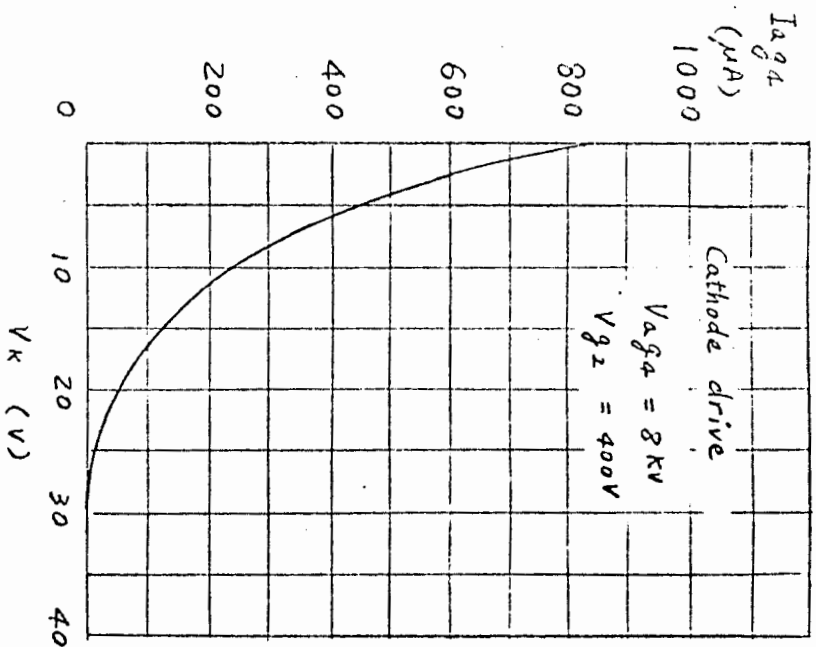
Anode Voltage .....	8000 volts
Grid-No.2 Voltage .....	400 volts
Grid-No.3 Voltage for focus 3) .....	0 to 400 volts
extinction of focused raster .....	20 to 43 volts

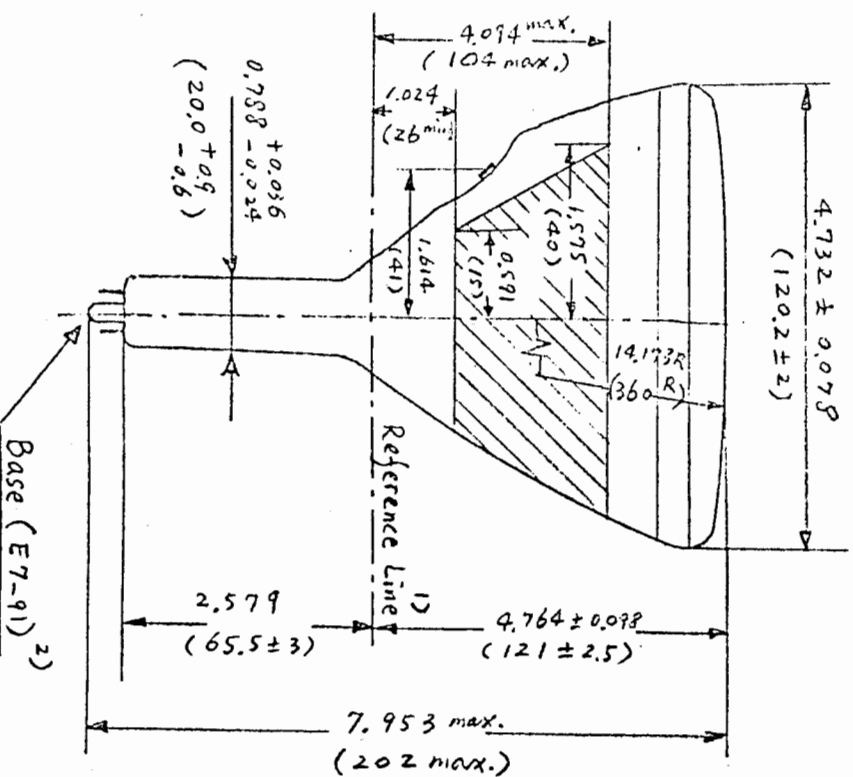
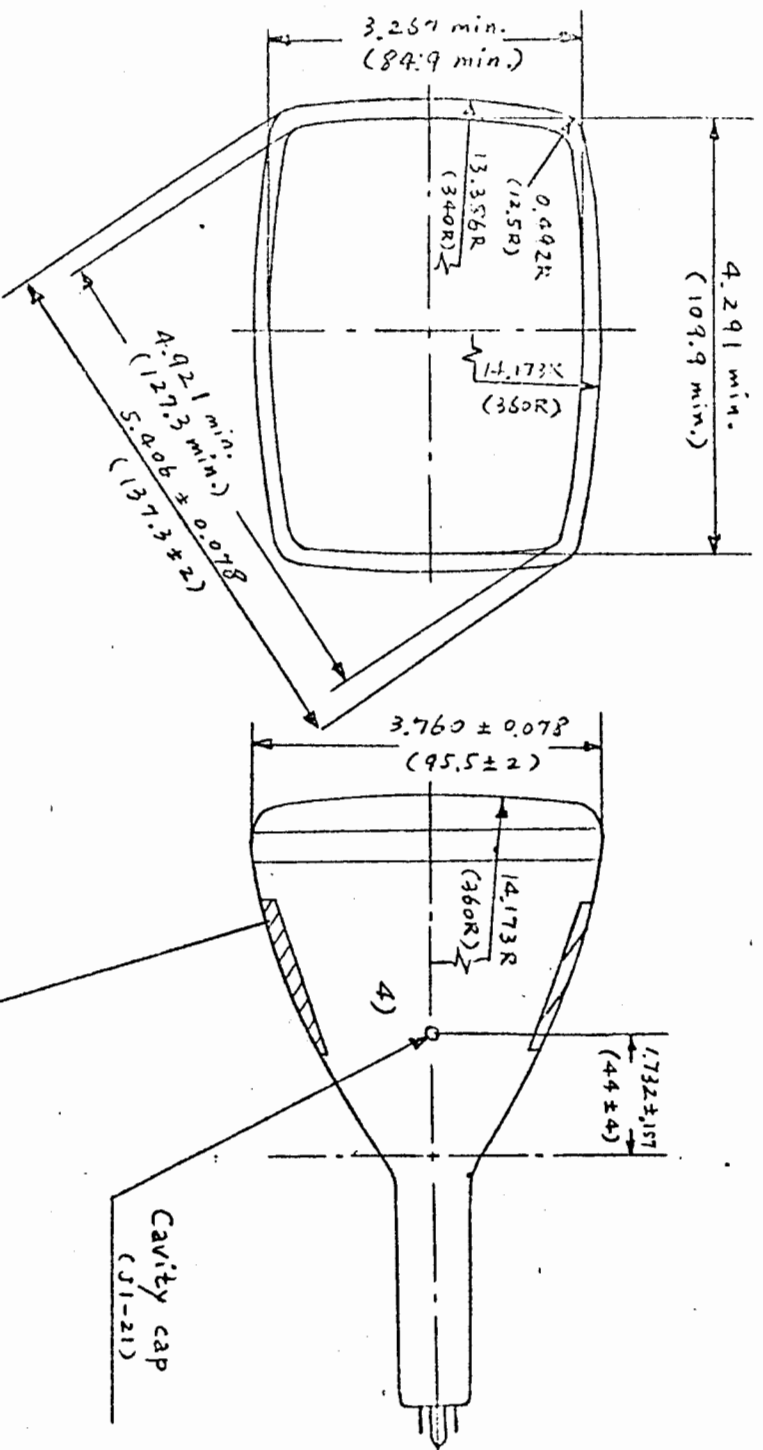
### MAXIMUM CIRCUIT VALUES

Grid-No.1 Circuit Resistance .....	1.5 max megohms
------------------------------------	-----------------

### NOTES

- 1) To avoid excessive hum the AC component of the heater to chassis voltage should be as low as possible and must not exceed 20V r.m.s.
- 2) The maximum distance between the centre of the field of this magnet and the reference line is 1.42" (36 mm).  
The centring magnet should be mounted as close to the deflection coils as possible.
- 3) Voltage range necessary to obtain optimum overall focus at a beam current of 55  $\mu$ A.





Dimensions in Inches (mm)

# NOTES (Concerning Sheet 6)

- 1) The reference line is determined by Reference line gauge JEDEC Type No. G-R5J1.
- 2) The socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. The bottom circumference of the base wafer will fall within a circle concentric with the bulb axis and having a diameter of 1.58" (40 mm).
- 3) The configuration of the outer coating is optional, but must contain the contact area as shown in the drawing. The external coating must be earthed.
- 4) This area must be kept clean.



Q-1 1N914  
Q-2 1N914  
Q-3 1N914  
Q-4 1N914  
Q-5 1N914  
Q-6 1N914  
Q-7 1N914  
Q-8 1N914  
Q-9 RCA 40410  
Q-10 RCA 40410  
Q-11 1N914

IC1 555

-C1 6.8µF 35Vdc  
-C2 2200PF  
-C3 2200PF  
-C4 1PF  
-C5 1PF  
-C6 .1"  
-C7 .1"  
-C8 15µF 20V  
-C9 .1"  
-C10 6.8µF 35V  
-C11 6.8µF 35V

-C12 35µF 50V  
-C13 35µF 50V

-R1 10K  
-R2 10K  
-R3 470Ω  
-R4 470Ω  
-R5 120Ω  
-R6 120Ω  
-R7 10K  
-R8 33K  
-R9 33K  
-R10 33K  
-R11 33K  
-R12 33K  
-R13 33K  
-R14 33K  
-R15 33K  
-R16 33K  
-R17 33K  
-R18 33K  
-R19 33K  
-R20 33K  
-R21 33K  
-R22 33K  
-R23 33K  
-R24 33K  
-R25 33K  
-R26 33K  
-R27 33K  
-R28 33K  
-R29 33K  
-R30 33K  
-R31 33K  
-R32 33K  
-R33 33K  
-R34 33K  
-R35 33K  
-R36 33K  
-R37 33K  
-R38 33K  
-R39 33K  
-R40 33K  
-R41 33K  
-R42 33K  
-R43 33K  
-R44 33K  
-R45 33K  
-R46 33K  
-R47 33K  
-R48 33K  
-R49 33K  
-R50 33K  
-R51 33K  
-R52 33K  
-R53 33K  
-R54 33K  
-R55 33K  
-R56 33K  
-R57 33K  
-R58 33K  
-R59 33K  
-R60 33K  
-R61 33K  
-R62 33K  
-R63 33K  
-R64 33K  
-R65 33K  
-R66 33K  
-R67 33K  
-R68 33K  
-R69 33K  
-R70 33K  
-R71 33K  
-R72 33K  
-R73 33K  
-R74 33K  
-R75 33K  
-R76 33K  
-R77 33K  
-R78 33K  
-R79 33K  
-R80 33K  
-R81 33K  
-R82 33K  
-R83 33K  
-R84 33K  
-R85 33K  
-R86 33K  
-R87 33K  
-R88 33K  
-R89 33K  
-R90 33K  
-R91 33K  
-R92 33K  
-R93 33K  
-R94 33K  
-R95 33K  
-R96 33K  
-R97 33K  
-R98 33K  
-R99 33K  
-R100 33K

PC-123  
Perfect  
Amp

FEEDBACK RESISTOR  
0.17Ω (3-.5Ω)

1 SWEEP IN  
2 SWEEP (GND) 30V  
3 Feedback 30V  
4 +3V  
5 NPN Base  
6 PNP Base  
7 -35V  
8 1N914  
9 1N914

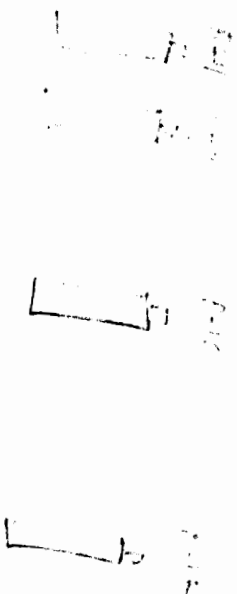
-R1 2K pot  
-R2 470Ω 1/2W  
-R3 2K  
-R4 470Ω 1/2W  
-R5 2K  
-R6 100K  
-R7 470Ω  
-R8 470Ω  
-R9 220Ω  
-R10 2K

HCS  
35

20-123

## Deflection Amp alignment

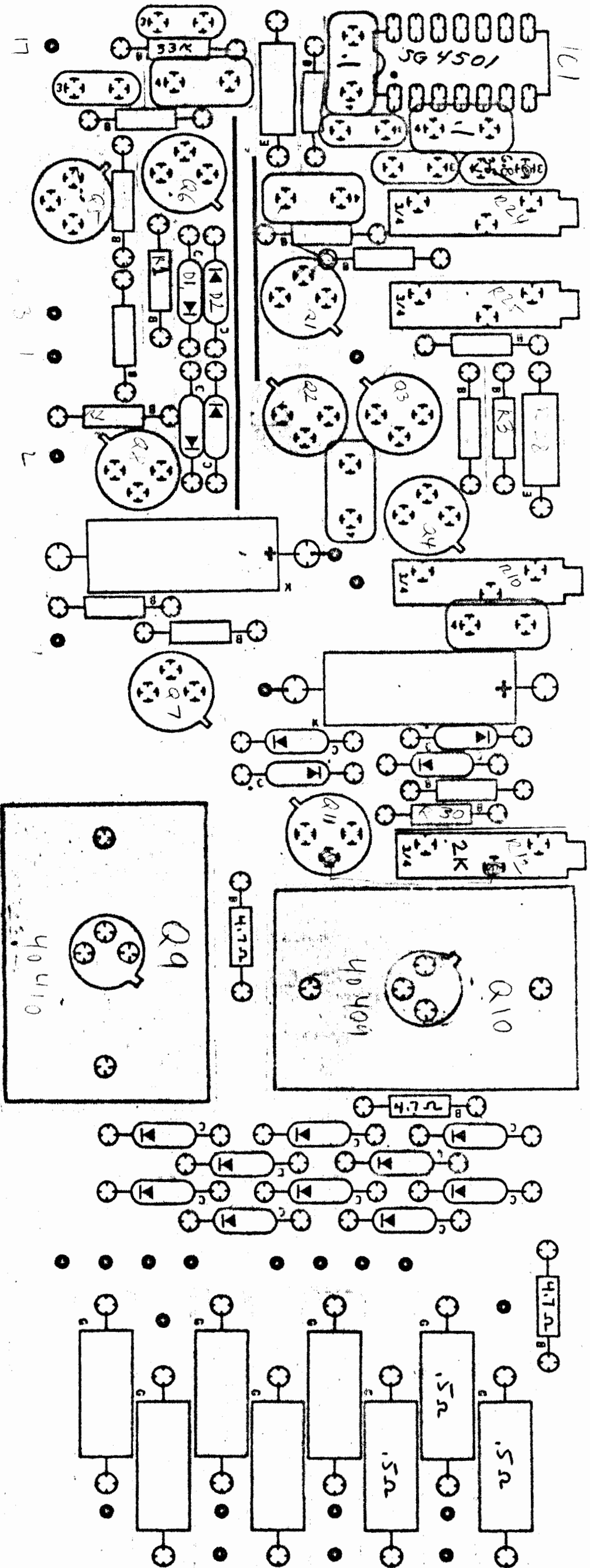
Power off  
adjust R12 CW all the way. Then free end, knuckle  
power  
adjust R25 for gain (signal on pin 1 only)  
adjust R10 with signal on pins 1 and 2 for full  
adjust R12 <sup>ccw</sup> for no overshoot and no oscillation  
adjust R24 for centering picture  
When done, remove from heatshrink



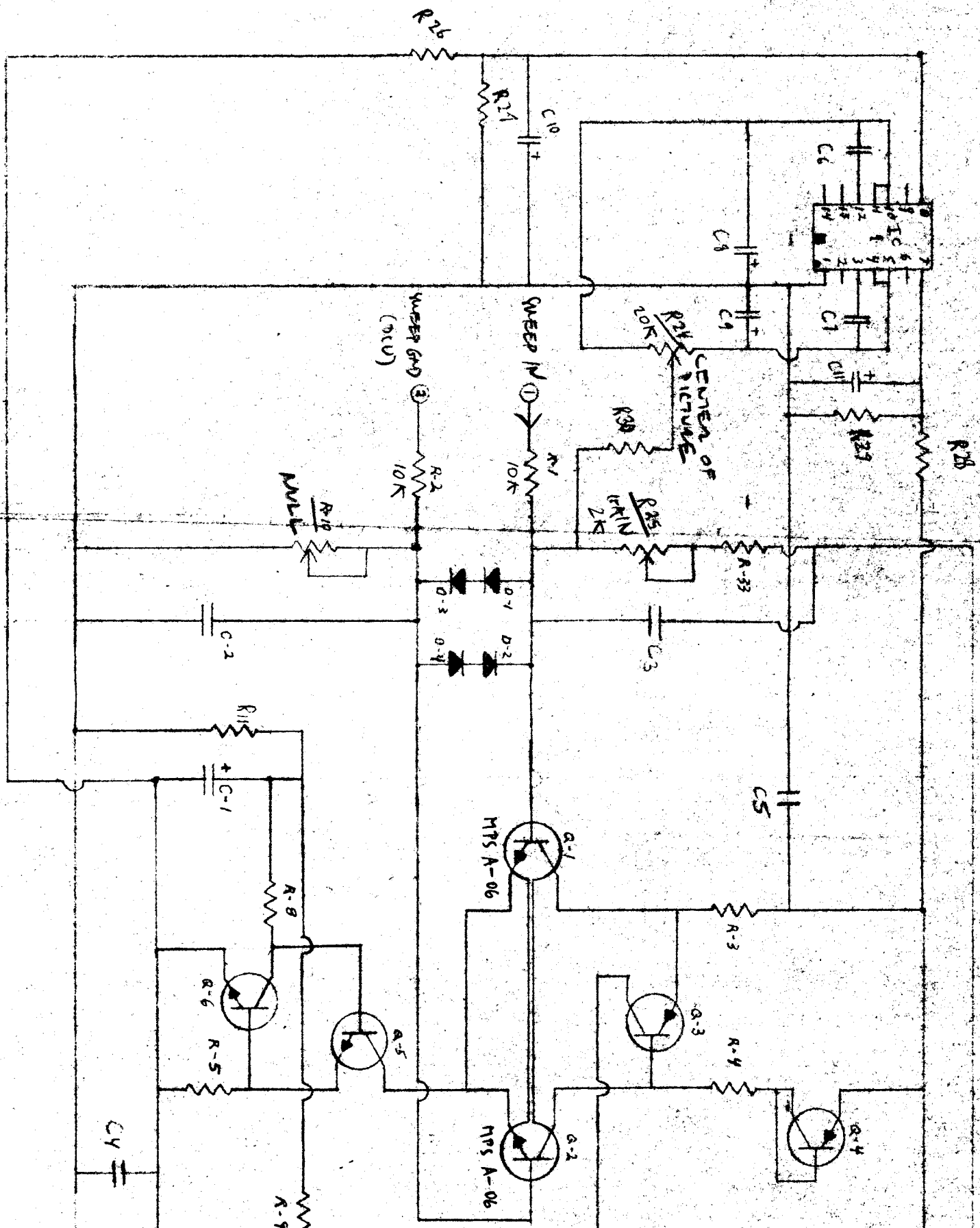
0.25  $\Omega$  FEEDBACK SHUNT; 1 AMP = 250 MV  
4 AMPS = 1 VOLT

HCS  
14

PC123



PC123 Deflection Amp





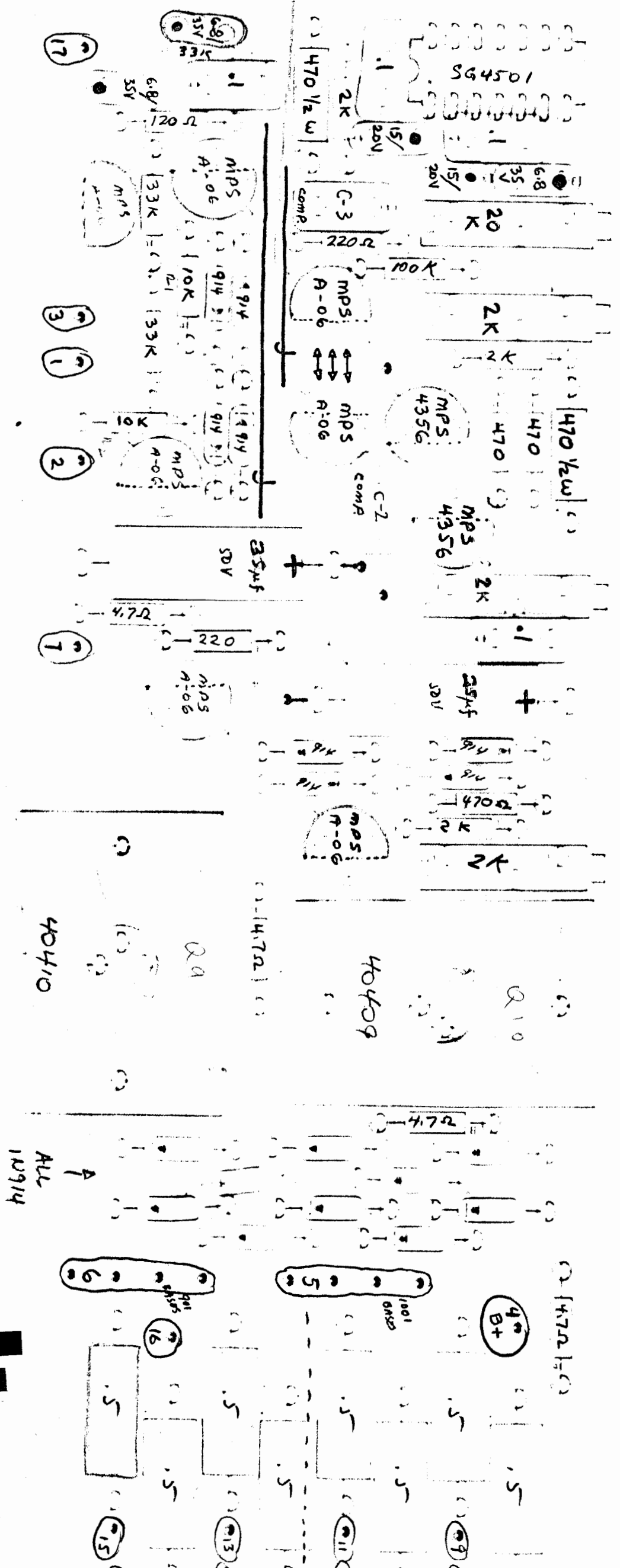


PC-123

TERMINALS:

- |                                |                       |                       |
|--------------------------------|-----------------------|-----------------------|
| 1. SWEEP IN                    | 12-13-14-15           | AMP EMITTERS (MJ1001) |
| 2. SWEEP (DC) GND              | 16 - YORE OUT         |                       |
| 3. FEEDBACK RESISTOR HIGH SIDE | 17 - GND              |                       |
| 4. +35V                        |                       |                       |
| 5. NPN BASES (MJ1001)          |                       |                       |
| 6. PNP BASES (MJ1001)          |                       |                       |
| 7. -35V                        |                       |                       |
| 8-9-10-11                      | AMP EMITTERS (MJ1001) |                       |

PC 123  
DEFLECTION AMP.



1700  
2272  
448

H- V SWEEP

PC-123

### TERMINALS:

1. SWEEP IN
  2. SWEEP (DCU) 500
  3. FEEDBACK RESISTOR HIGH 5100
  4. +35V
  5. NPN BASES (mJ 1001)
  6. PNP BASES (mJ 901)
  7. -35V
- 8-9-10-11 NPN EMITTERS (mJ 1001)

12-13-14-15 PUP emitters (mJqol)

16 - 40RB OUT

17. GPO

PC 123  
DEFLECTION AMP.



22021 1910

water meter

2000

[illegible]

-R-5 1K  
 -R-6 1K  
 -R-7 10K  
 -R-8 100K

-R-7 10K  
-R-8 100K  
-R-9 4.7K

—1-10 22K  
—1-11 7.7K

10.11

— K-15 2.2K  
 — K-14 2.2K  
 — K-13 2.2K  
 — K-12 2.2K  
 — K-11 2.2K  
 — K-10 2.2K  
 — K-9 2.2K  
 — K-8 2.2K  
 — K-7 2.2K  
 — K-6 2.2K  
 — K-5 2.2K  
 — K-4 2.2K  
 — K-3 2.2K  
 — K-2 2.2K  
 — K-1 2.2K

6-19	2016
1	
1	
1	

1-7-18

291K

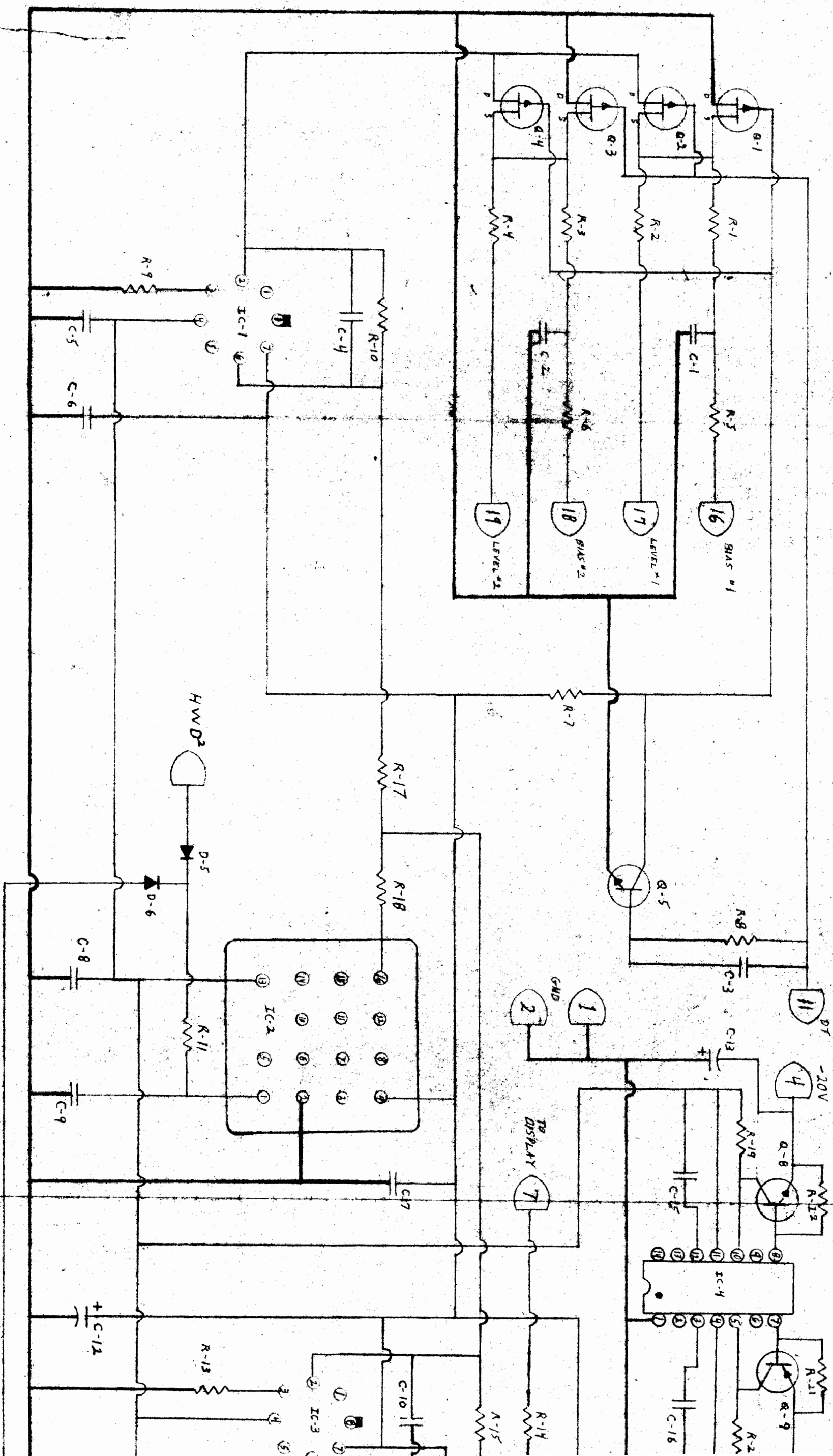
1155

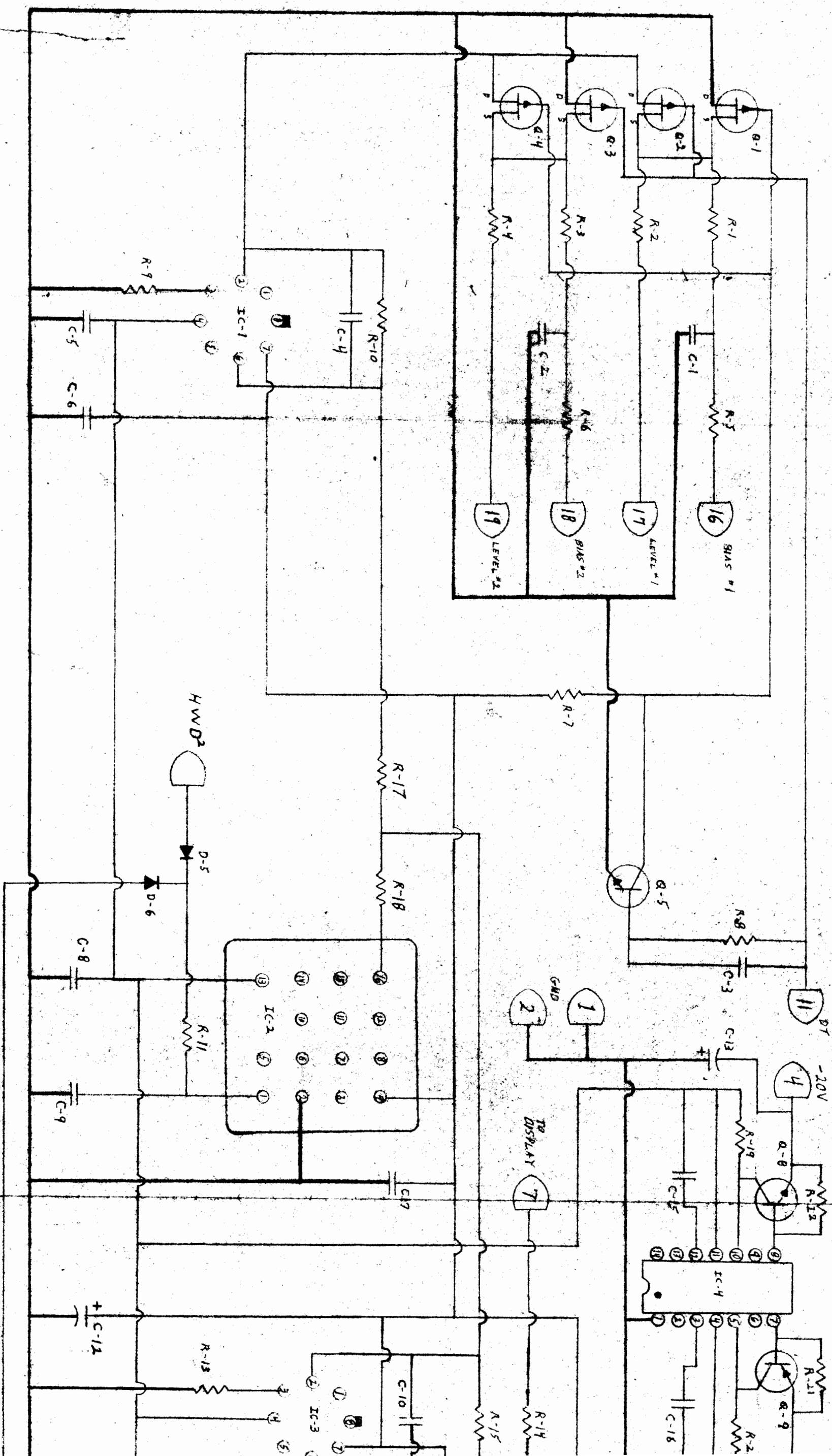
1-10-K

— 1-26 10K  
— 1-27 10K

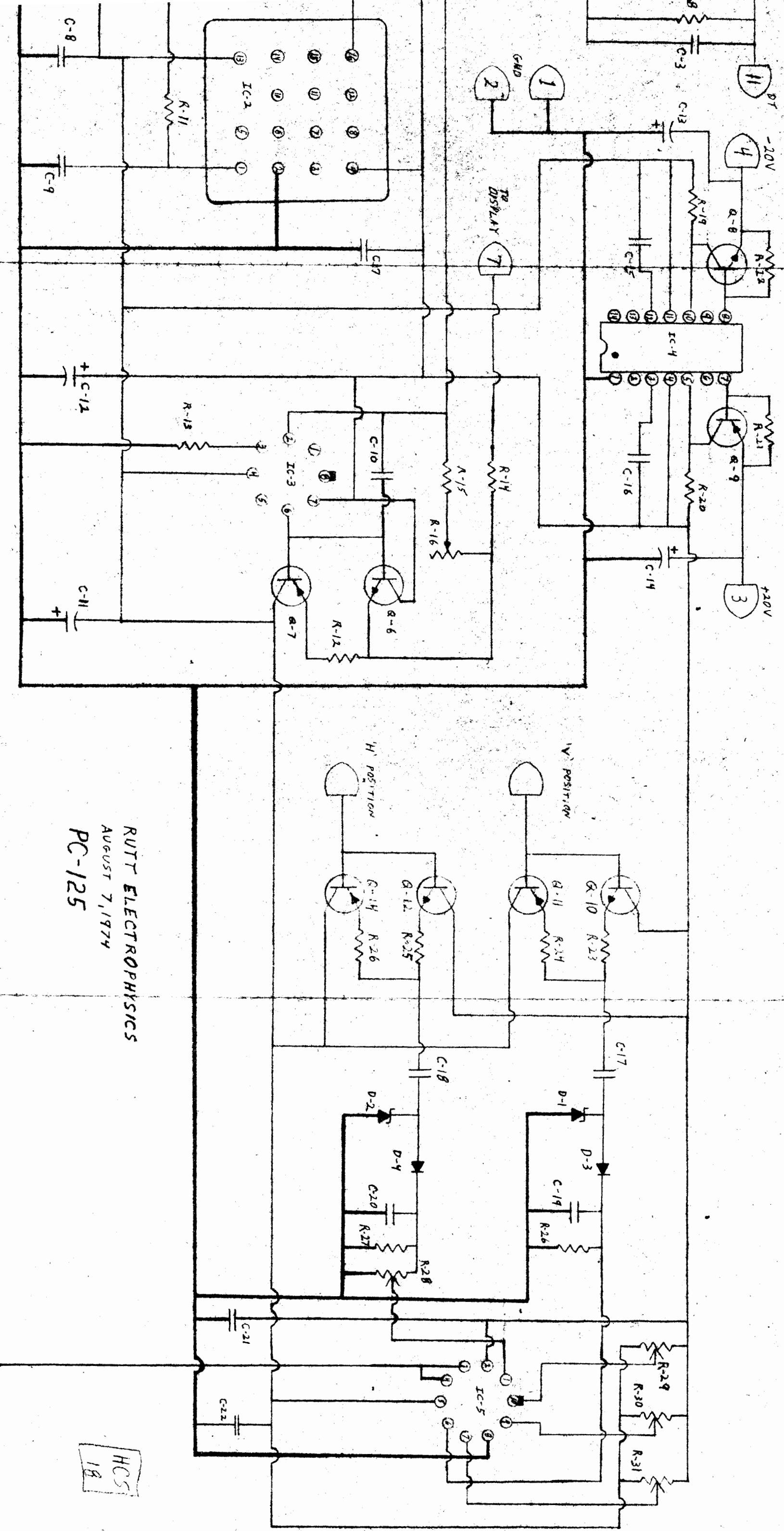
1410-12-1

HCS  
34









RUTT ELECTROPHYSICS  
 AUGUST 7, 1974  
 PC-125

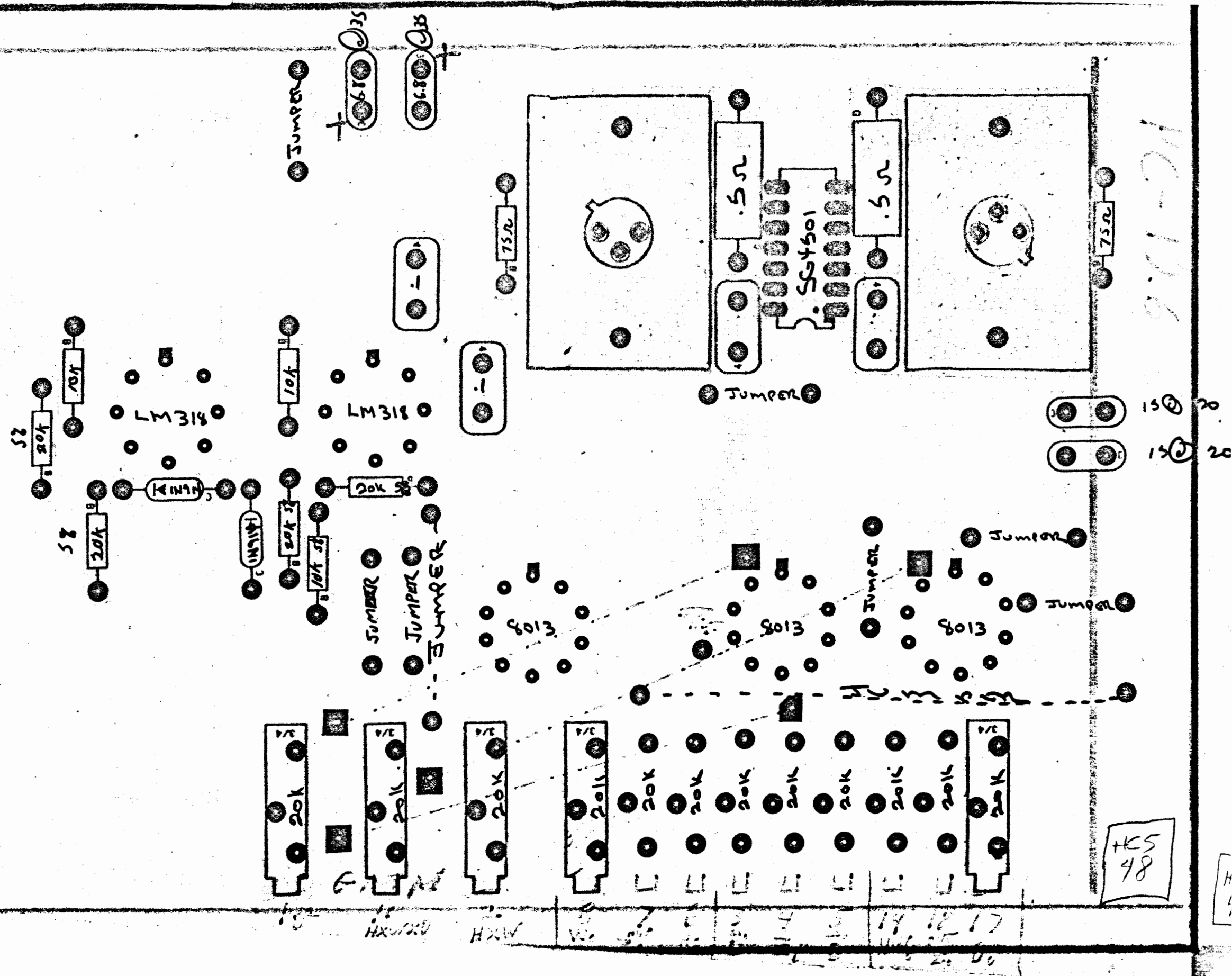
HCS  
 18



PC-126

2013	2013	-C-1 .14	CER	R-1	20K POT	DEPTH <sup>2</sup> GAIN
2013		-C-2 .14	CER	R-2	20K POT	(H <sub>1</sub> H <sub>2</sub> ) GAIN
		-C-3	154 20V TANT.	R-3	20K POT	DEPTH ZERO
LM 318		-C-4	154 20V 11	R-4	"	OUTPUT OFFSET
LM 318		-C-5	.14 CER	R-5	"	TRIMMER ZERO
2013		-C-6	.14 CER	R-6	"	HEIGHT ZERO
SG 4501		-C-7	B.B. 300	R-7	"	OUTPUT OFFSET
		-C-8		R-8	"	WIDTH ZERO
				R-9	20K 5%	
11111 40403				R-10	10K	
2 40403				R-11	20K 5%	
				R-12	10K	
201 12914				R-13	20K 5%	
11				R-14	10K 5%	
				R-15	20K 5%	
				R-16	20K POT	OUTPUT GAIN
				R-17		DEPTH OUT 30V
				R-18		OUT ZERO
				R-19		H W OUT ZERO
				R-20		50k Dale
				R-21		50k Dale
				R-22	75R	
				R-23	75R	

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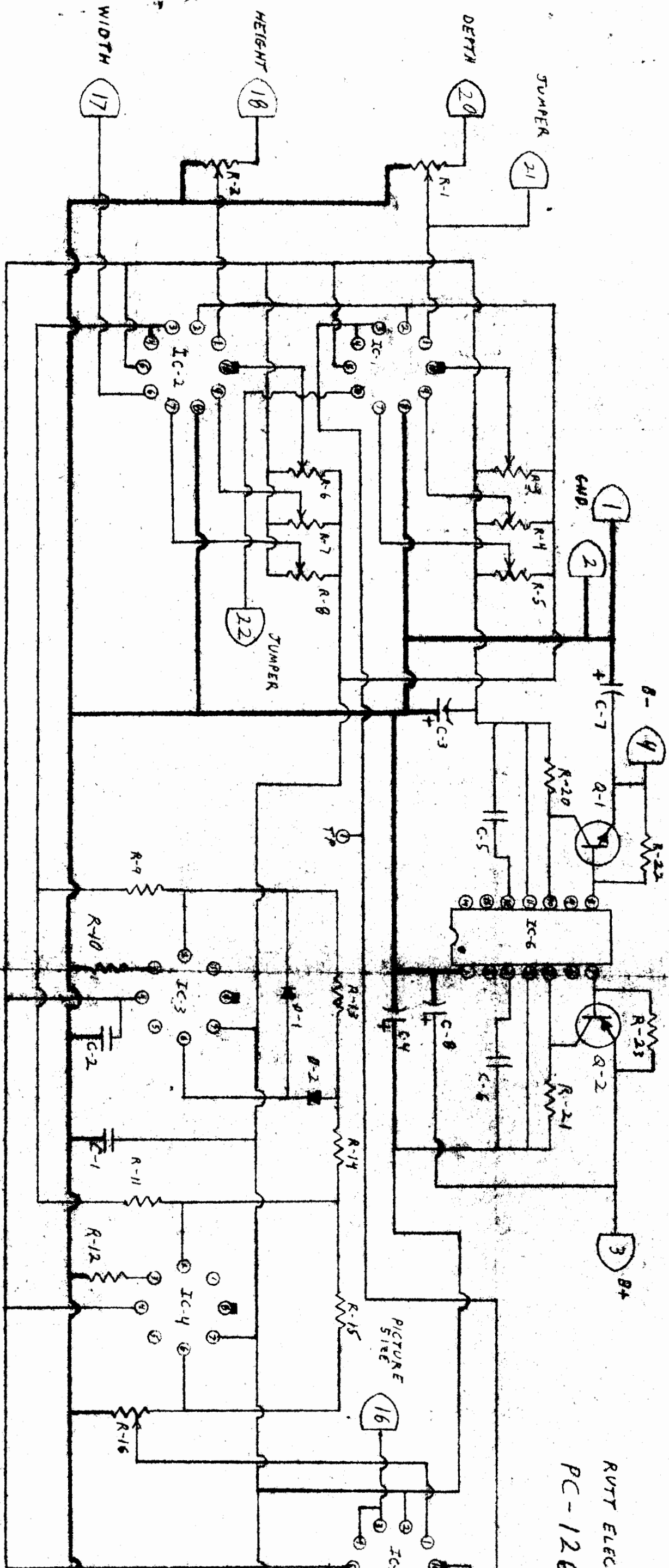


1C-11.6

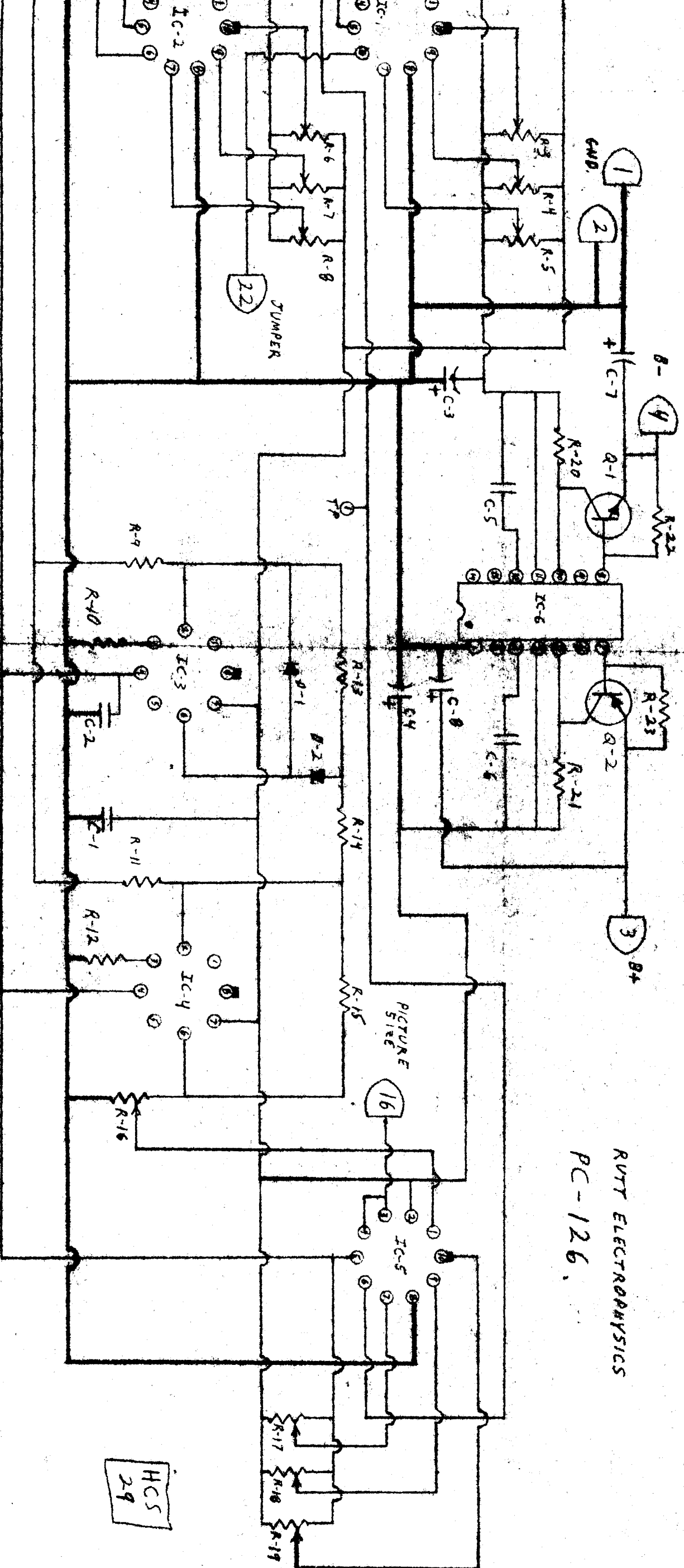
15 20  
15 20

HCS  
48

H









# RUTT ELECTROPHYSICS

21-29 West 4th Street, New York, N.Y. 10012 (212) 982-8300

1C-1 MC 1494  
1C-2 LM 318  
1C-3 LM 318  
1C-4 LM 318

D-1- 1N 914  
D-2- 1N 914  
D-3- 1N 914  
D-4- 1N 914  
D-5- 1N 914  
D-6- 1N 914

PC 127A  
JAN 24, 75

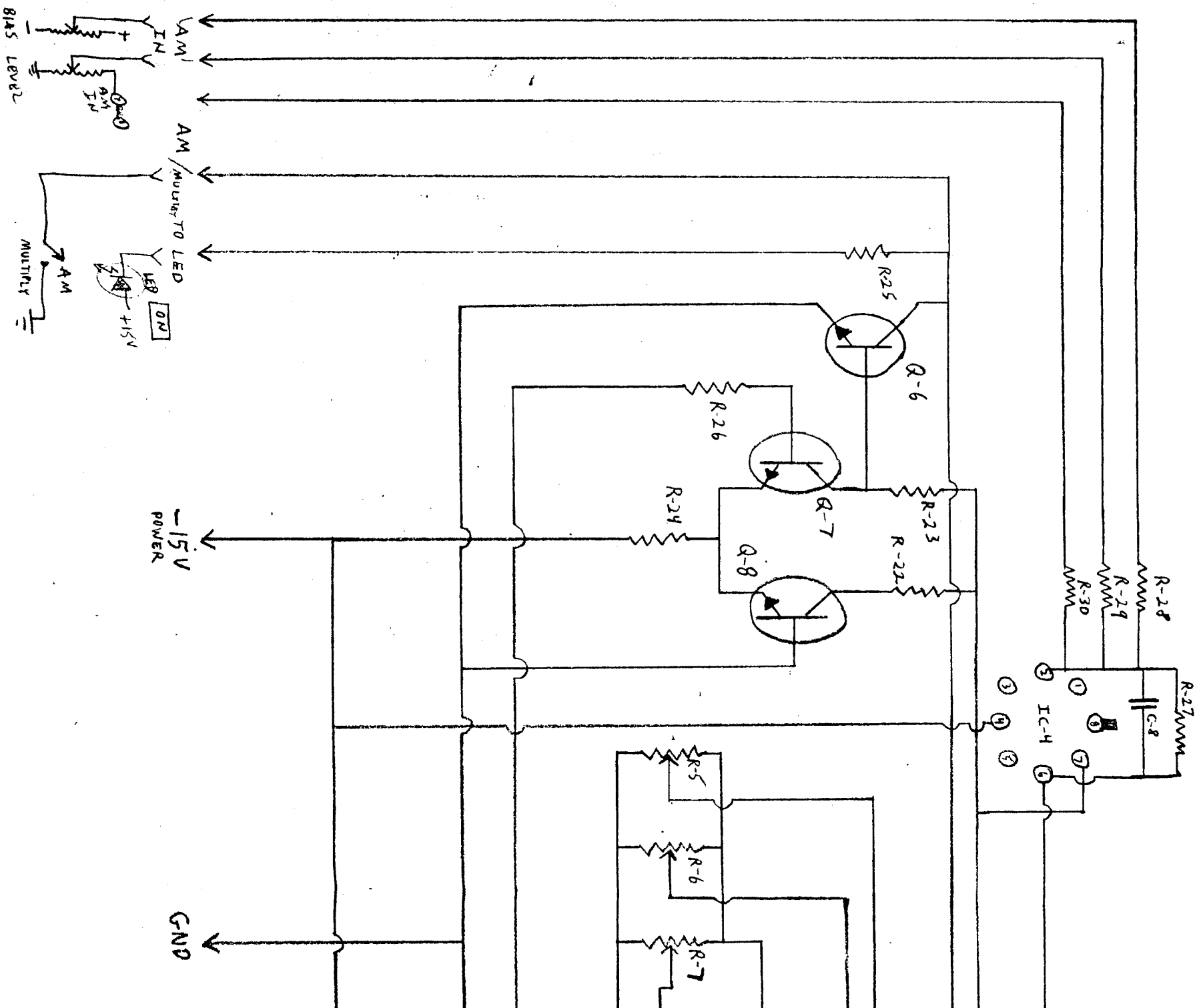
Q-1 NPN 2N 3568  
Q-2 PNP 2N 3638  
Q-3 NPN 2N 3568  
Q-4 PNP 2N 3638

Q-5 FET 2N 5462  
Q-6 NPN 2N 3568  
Q-7 NPN 2N 3568  
Q-8 NPN 2N 3568

C-1 10 PF  
C-2 10 PF  
C-3 15 of 20V  
C-4 15 of 20V  
C-5 10 PF  
C-6 .1 cer  
C-7 .1 cer  
C-8 10 PF  
C-9 .1 cer

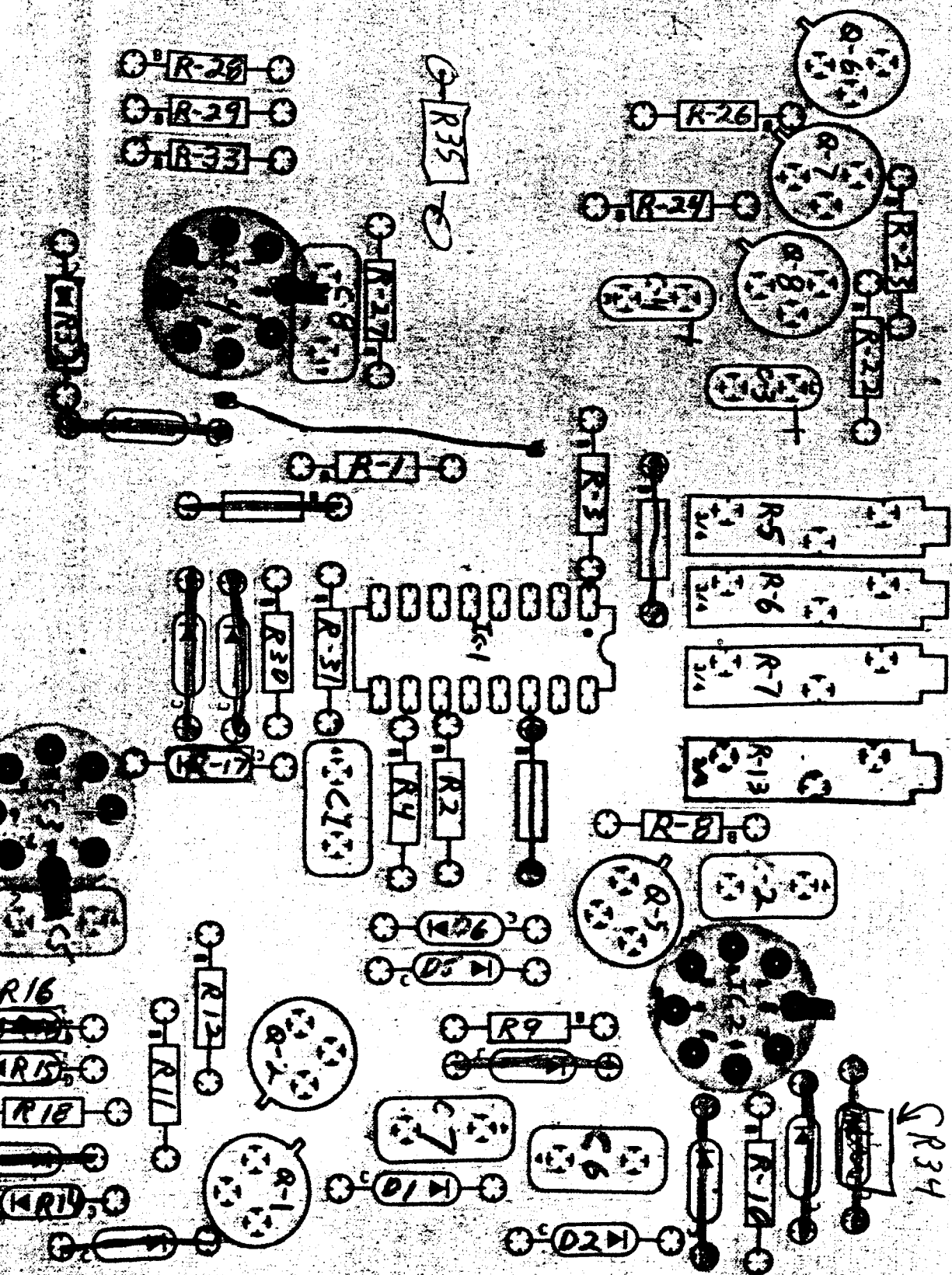
R-1 27K  
R-2 15K  
R-3 12K  
R-4 510  $\Omega$   
R-5 20K pot  
R-6 20K pot  
R-7 20K pot  
R-8 47K  
R-9 10K  
R-10 10K  
R-11 10  $\Omega$   
R-12 10  $\Omega$

R-13 20K pot  
R-14 150  $\Omega$   
R-15 10K  
R-16 10K  
R-17 10K  
R-18 10K  
R-19 10  $\Omega$   
R-20 10  $\Omega$   
R-21 150  $\Omega$   
R-22 6.8K  
R-23 20K  
R-24 6.8K  
R-25  
R-26 10K  
R-27 20K  
R-28 15K  
R-29 10K  
R-30 2.2K  
R-31 10K  
R-32 4.7K  
R-33 omit  
R-34  
R-35 10K  
R-36 4.7K

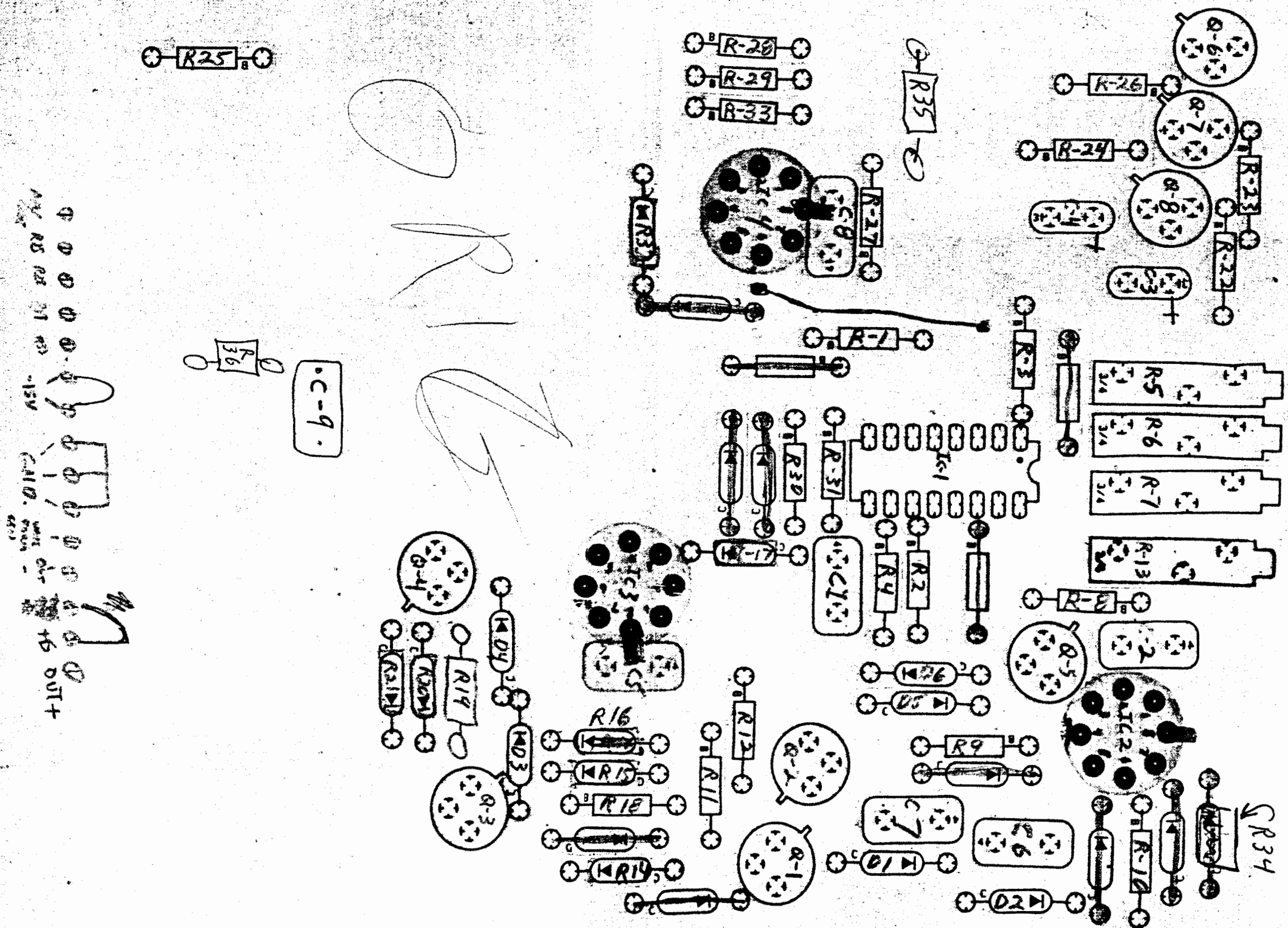


PC-127A

Jan 29, 75



JAN 29, 1975





Corrections to PC 132

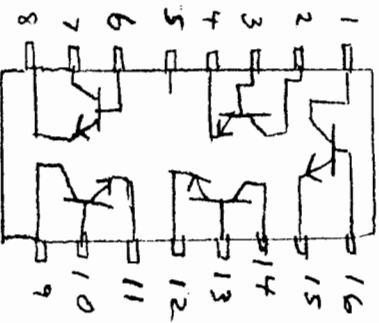
- 1) R30, IC-10, and Q4 base; are not supposed to go to +15
- 2) IC-10 / Pin 7 and other components, on the same wire, should also go to -15 Volt
- 3) R44 is not grounded
- 4) IC-2 / Pin 2 and 4, are 'messed up'  
Connect Pin 4 to B-  
Cut B- from Pin 2 and reconnect Pin 2 to : D5 and C3
- 5) Put resistors in series with the +28Volt and -28 Volt to limit the 40409,40410 power dissipation.
- 6) Crossed off but was: 'Change c-21 to 0.1 uf cer, or 2 tantalums back to back'. This number is no longer in effect
- 7) Change R44 to 10k ohms, from 100k ohms (this change is noted on parts list)
- 8) Change R54 to 220k ohms (this change is noted on parts list)
- 9) Add 470k ohm resistor, from ( C22, R28, R22 junction) to Pin2 of IC-8 . This offsets log circuit, to help linearize the Intensity Input.
- 10) Change R44 from 10k ohms to 4.7k ohms, (change noted on parts list).
  - A) " White Stretch, is ' OFF' , when pot. is C.W.
  - B) R46 and R47, control the gain of the Multiply amp.  
If gain is too high, (too much contrast), Raise their value (1n proportion) , and lower C9 by the same proportion, and you will reduce gain.
- 11) Add 2.7 ohm resistor, 1n series with B-, to Q2, R51, C18 junction.
- 12) Change C-18 to 15 uf(microfarad) at 20 Volt, Tantalum. The plus(+) side is the ground side.
- 13) Change C16 to 15 uf (microFarad) at 25 Volt.
- 14) Omit C13 ( be sure to change R27 ground.).
- 15) Add a 1 pf (picofarad) capacitor, between IC8/pins 2 and pin 6.
- 16) Add 33 ohm resistors, instead of jumpers, on the + and - 28 Volt lines, going to the SG4501 voltage regulator.
- 17) Place a 47 ohm resistor 1n series with the cathode.
- 18) Add a 10k ohm resistor 1n series with G-2

;

- 21) Add a resistor in series with the +45 Volt input.

Pinout for CA-3083

- GENERAL PURPOSE, HIGH CURRENT NPN TRANSISTOR ARRAY



PC132 Parts List - High Resolution CRT Driver  
with V,H,D<sup>2</sup> Correction

Revised Jan. 16, 1975

Retyped Jeffrey Schier 6/1/78

Note: All resistor values are 5%  $\frac{1}{4}$  Watt unless otherwise noted

Integrated Circuits

IC 1 - LM318H  
IC 2 - LM318H  
IC3 to IC8 - LM318H  
IC 9 - CA3083 (? 30183 ,80 Volt)  
IC 10 - MC1595 with heat sink  
IC 11 - SG4501

Transistors

Q1 - 2N3568 or equivalent  
Q2 - 2N3646  
Q3 - 2N5770 (note Q3 and Q4 should  
Q4 - 2N5770 be strapped together)  
Q5 - 2N2219A  
Q6 - 2N3646  
Q7 - 2N5770 Q9 - 40409  
Q8 - 2N3646 Q10 - 40410

Diodes

D1 to D7 - 1N914A  
(note : Diode leakage must be  
less than 1 uA at 15 Volt reverse  
bias)  
D8 - 1N914  
D9 - Zener 1N5248B

Resistors - (Values in ohms)

R1 - 10K 1%  
R2 - 10K 1%  
R3 - 4.7K  
R4 - 10K 1%  
R5 - 10K 1%  
R6 - 4.7K  
R7 - 10K 1%  
R8 - 5K 1%  
R9 - 10K 1%  
R10 - 5K 1%  
R11 - 5K 1%  
R12 to R14 - 510 (possibly changed  
to 470 ohm)  
R15 - 18K  
R16 - 1K  
R17 - 4.7K  
R18 - 4.7K

Resistors (continued)

R19 - 20K 1%  
R20 - 20K 1%  
R21 - 10K 1%  
R22 - 100K  
R23 - 3.3K  
R24 - 10K trim  
R25 - 10K  
R26 - 10K  
R27 - 4.7K  
R28 - 4.7K  
R29 to R32 - All 510 ohm or  
all are 470 ohm  
R33 - 100  
R34 - 220  
R35 - 220  
R36 - 1K  
R37 - 1K  
R38 - 100  
R39 - 1K  
R40 - 100  
R41 - 1K  
R42 - 20K trim  
R43 - 20K trim  
R44 - 4.7K  
R45 - 100K  
R46 - 10  
R47 - 100  
R48 - 680  
R49 - 510  $\frac{1}{2}$  Watt (or 470)  
R50 - 510  $\frac{1}{2}$  Watt (or 470)  
R51 - 1K  
R52 - 1K  
R53 - 10K  
R54 - 220K  
R55 - 510  
R56 - 1K trim  
R57 - 75  
R58 - 1K  
R59 - 10K  
R60 - 10K  
R61 - 2.7K  
R62 - Dale 0.5 ohm 1%, 1 Watt  
R63 - Dale 0.5 ohm 1%, 1 Watt  
R64 - 75

# PC 132 Parts List- High Resolution CRT Driver

with V, H, D<sup>2</sup> Correction (continued)

Revised Jan. 16, 1975

retyped by Jeffrey Schier 6/1/78

## Resistors (continued)

Note-- all values in ohms  
5% 1/4 Watt unless otherwise noted

R65 - 75 ohm  
R66 - 20K trim (GR10 #1)  
R67 - 4.7K

## Capacitors (continued)

C34 - 6.8 uf 35 VDC (Tantalum)  
C35 - ? uf ceramic disc  
over 300 volt  
C36 - 0.01uf 1KV ceramic disc  
C37 - 0.01 uf 1KV "  
C38 - 0.01 uf 1KV "  
C39 - 0.01 uf 1KV "

## Capacitors

C1 - 47 pf ceramic disc  
C2 - 47 pf "  
C3 - 47 pf "  
C4 - 47 pf "  
C5 - 47 pf "  
C6 - 10 pf "  
C7 - 10 pf "  
\* C8 - 100 pf "  
\* C9 - 100 pf "  
C10 - 15 uf @ 20 Volts (Tantalum)  
C11 - 15 uf @ 20 Volts "  
C12 - 22 uf @ 50 Volts "  
C13 - 0.1 uf ceramic disc  
C14 - 0.1 uf "  
C15 - 0.1 uf "  
C16 - 0.1 uf "  
C17 - 0.1 uf "  
C18 - 0.1 uf "  
C19 - 0.1 uf "  
C20 - 0.1 uf "  
C21 - 15 uf / 20 Volt (Tantalum)  
C22 - 0.1 uf ceramic disc  
C23 - 0.1 uf "  
C24 - 0.1 uf "  
C25 - 220 pf "  
C26 - 220 pf "  
C27 - 0.1 uf "  
C28 - 0.1 uf "  
C29 - 0.1 uf ceramic disc  
C30 - 0.01 uf "  
C31 - 0.01 uf "  
C32 - 6.8 uf / 35 VDC (Tantalum)  
C33 - 6.8 uf / 35 VDC "

\* Compensation Capacitors should be adjusted for High Frequency Bandwidth

### Alignment Procedure

Note : System should be warmed up, for 5 minutes  
before alignment is attempted.

- 1) Intensity Offset - Tube not cut-off when
  - Hin = zero volts
  - Vin = zero volts
  - Din = zero volts
  - Intensity Pot all the way 'down'

Procedure - Set controls to the above values. Adjust  
R45 for No visible picture, or no Video on Crt Cathode

- 2) Black Level - Self explanatory

- 3) Low Level Exponential Adjust -  
 Procedure - Adjust tube cutoff (set intensity to zero, and  
 just turn Crt spot out.  
 For 'low level intensity' turn R56 all the way CCW.  
 Black level, is -0.7 volts at IC10/Pin 12, with Video grounded.  
 Set sizes and intensity, for a picture ( Very low level,  
 small size picture)  
 Adjust "exponent adjust" for a constant 'Visual' intensity,  
 as the picture is changed in size.

- 4) Break Point Adjust - Adjust size or intensity, until shading  
 error appears. Try adjusting R56 until shading vs. intensity  
 is at its best value.

### Layout Notes

Marked (\*) resistors are 1% or better (preferably metal film)  
 (different size?) 1K : 2K is independent from 10K to 20K

Heavy + and - 15 Volt traces.

A Ground Plane

Leave IC's 2,3,4,5,6,7,8 equidistant  
 (about 1 inch) from IC9, for thermal reasons.

A short length CRT cathode lead.

You can move inputs (Vin,Hin, Din) together to a convenient spot.  
 Video input cannot be moved.

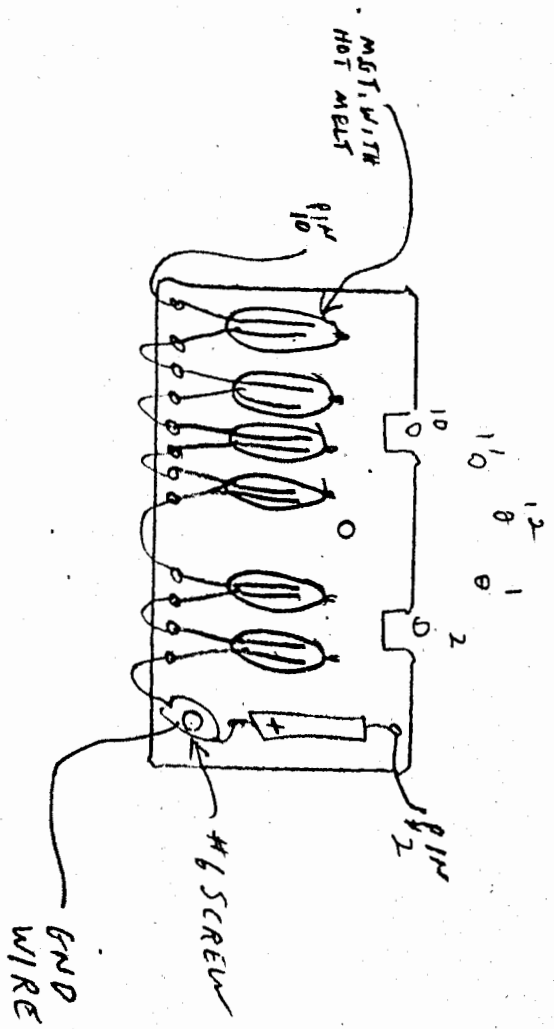
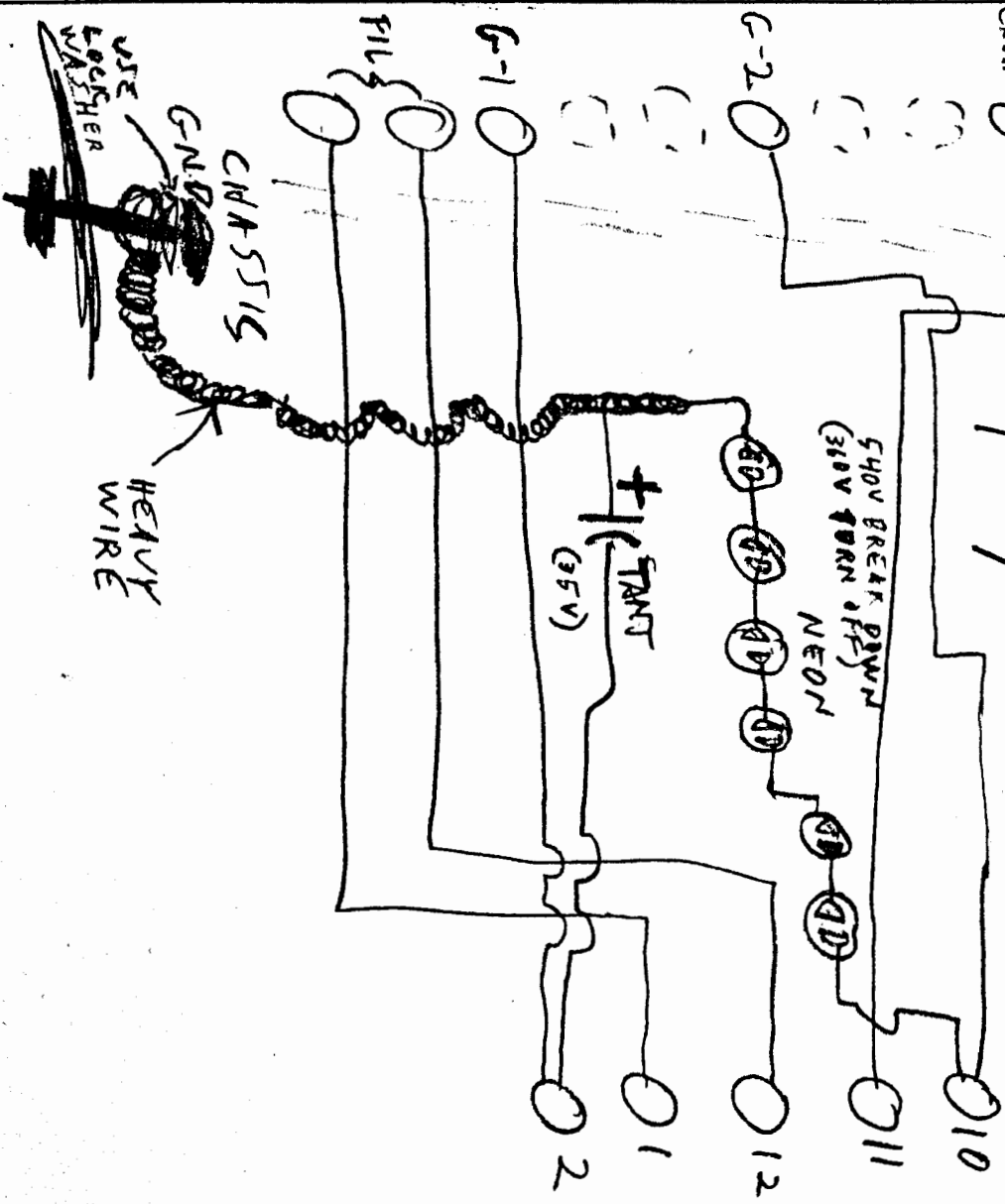
Video 75 ohm load is now at the BNC panel connector.

Q3 and Q4 should strapped together, for heat transfer, with  
 silicone between the transistors.



# CRT SOCKET FOR PC-132

3/13/75



PC-132

100E  
SOCKET  
CONNECTIONS

# PANASONIC TUBE



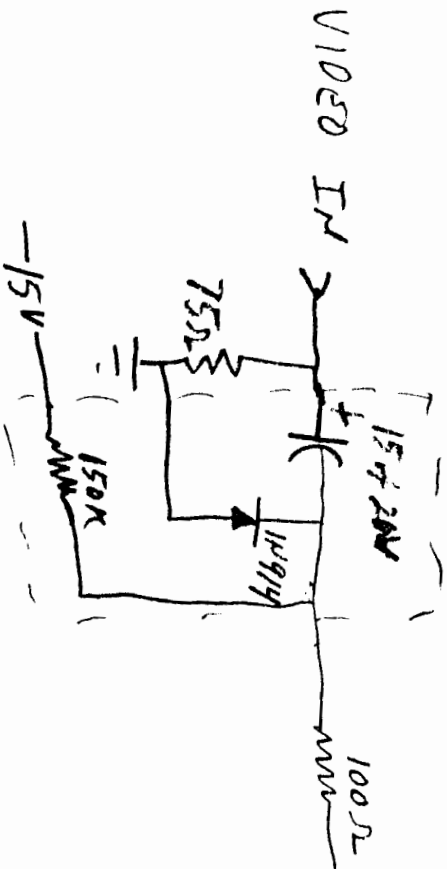
BACK VIEW

- 1) KATHODE (GREEN)
- 2) G-2 (YELLOW) +500V
- 3) FIL. (BROWN)
- 4) FIL. (BLACK) } 12.6V
- 5) G-1 (RED)
- 6) DO NOT USE
- 7) G-3 (ORANGE) FOCUS WIPER 070+500V

PC-132

CHICAGO

# VIDEO CLAMP



add 1/4 to 50p carbon unless marked

R37-1K

100-  
1K

$$\frac{100}{K} - \frac{100}{K-1}$$

71-  
 42- 20K 1mm  
 43- 20K 1mm  
 44- 4.7K  
 45- 100K

12- 510-  
13- 510- } (470-)

14-510-2 }

15-18K

R57 752

17- 4.7K  
18- 4.7K

R57 752  
R58 1K  
R59 10K  
R60 10K  
R-61 2.7K

19-	20K	1P
20-	20K	1P
21-	10K	1P

24- 3.31- 10K trim

27- 4-7K  
28- 4-7K

$$\begin{array}{r} 29 - 510 \sim \\ 30 - 510 \sim \\ 31 - 510 \sim \end{array} \left. \vphantom{\begin{array}{r} 29 - 510 \sim \\ 30 - 510 \sim \\ 31 - 510 \sim \end{array}} \right\} \begin{array}{r} \text{all } 510 \sim \\ \text{all } 470 \sim \end{array}$$

all 5122  
on  
all 4702

35- 220-2  
36- 1K

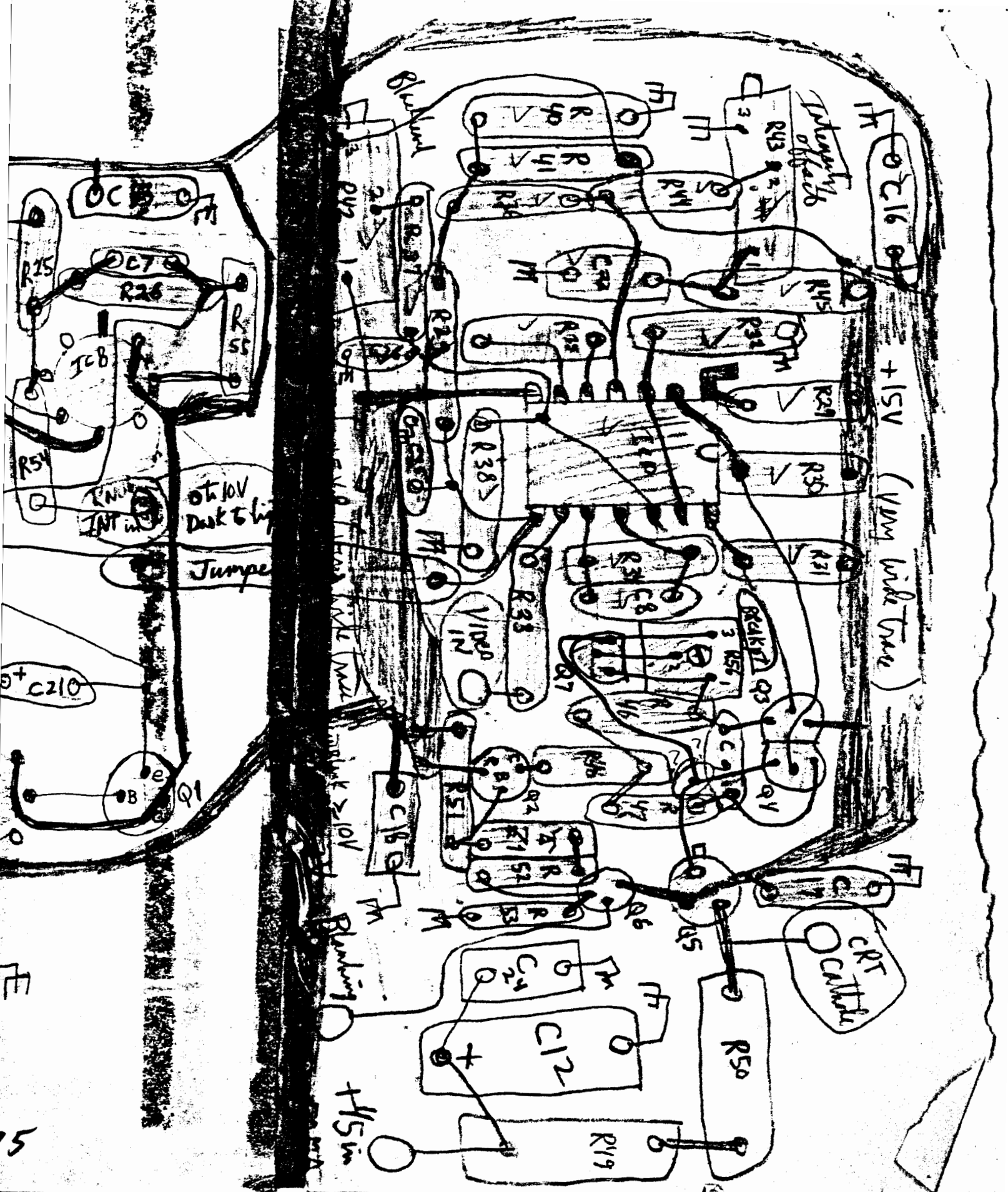
1/4/41  
D-8

2nd JN 5248 B

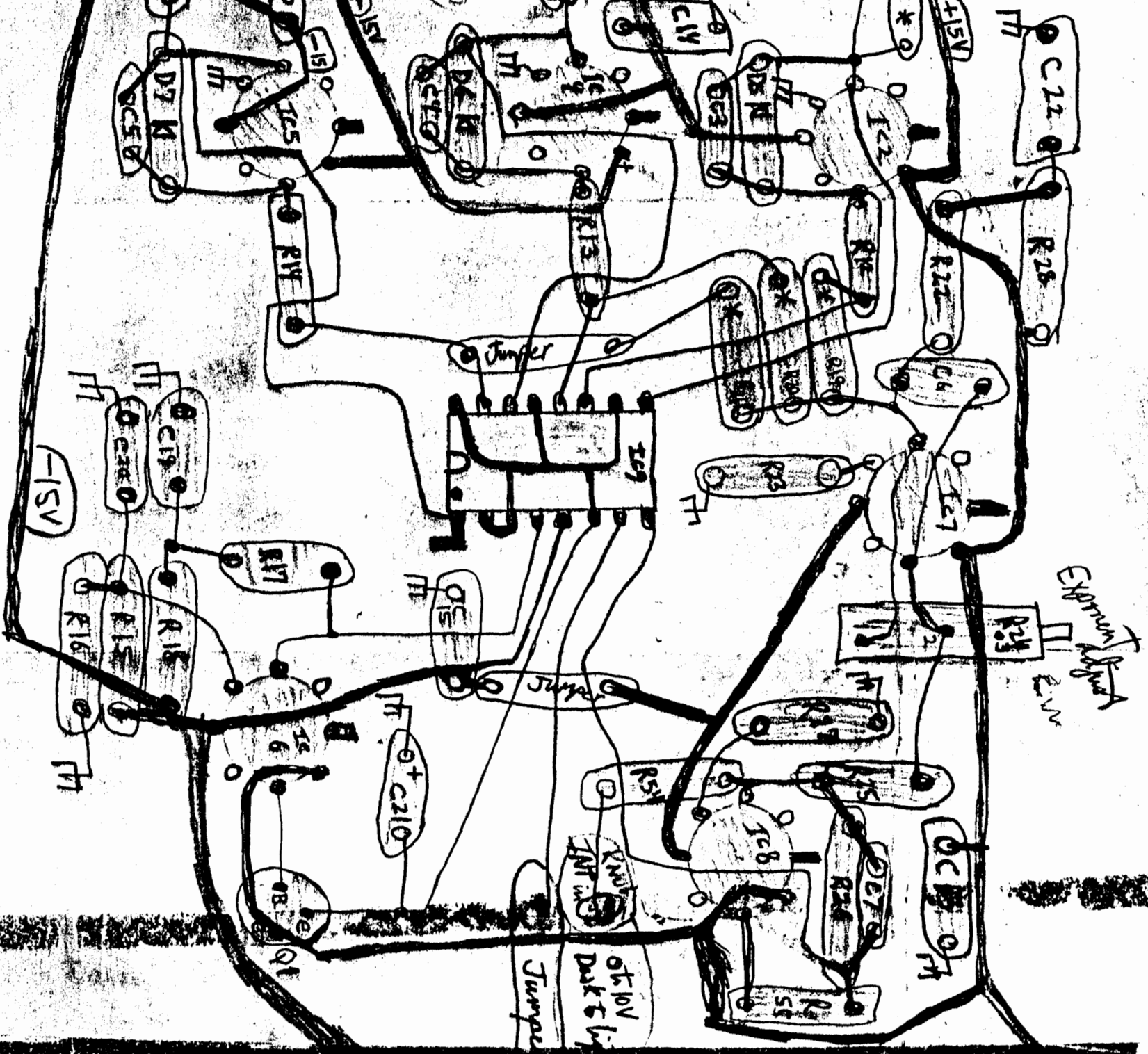
2

三

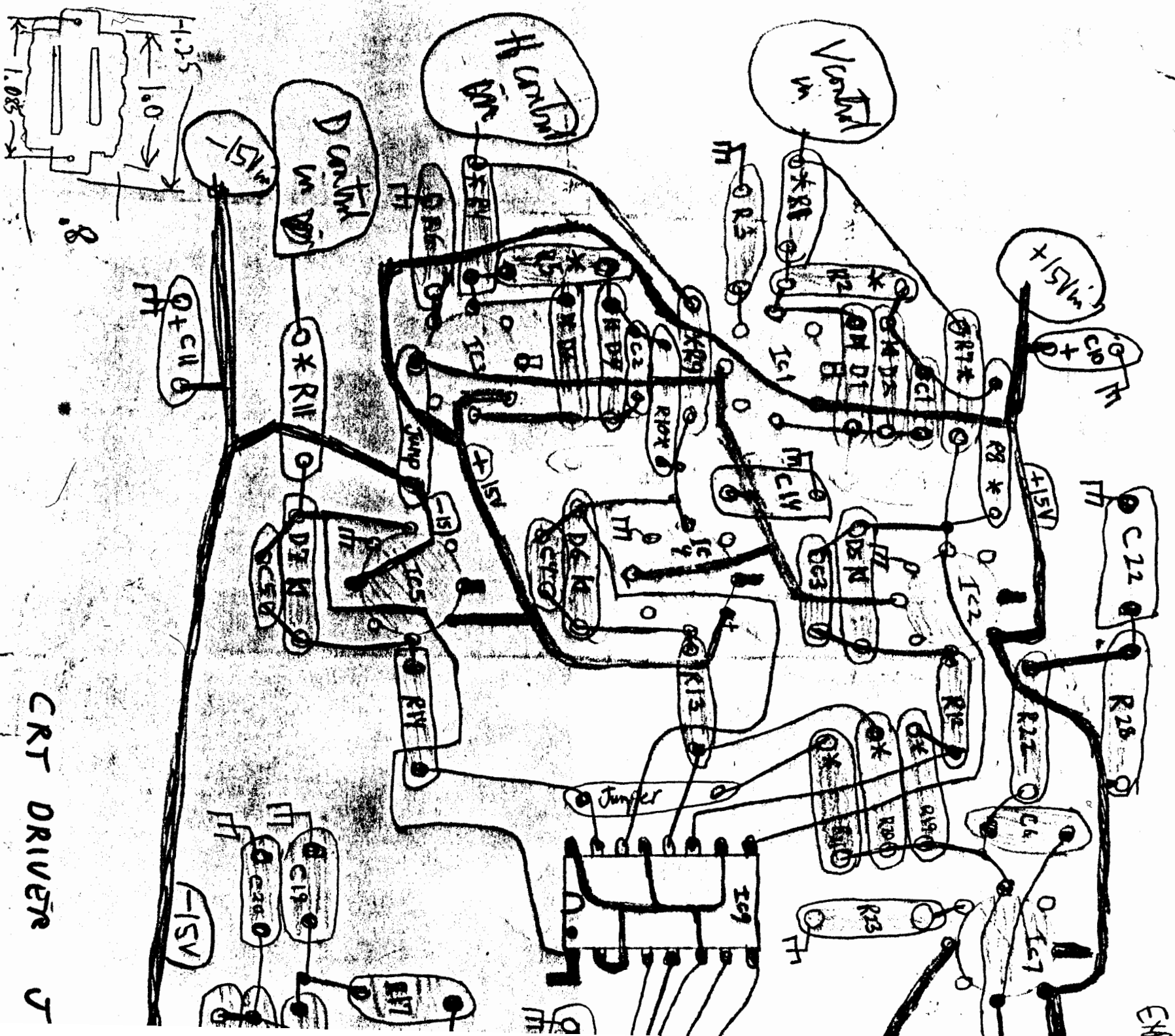
0-107





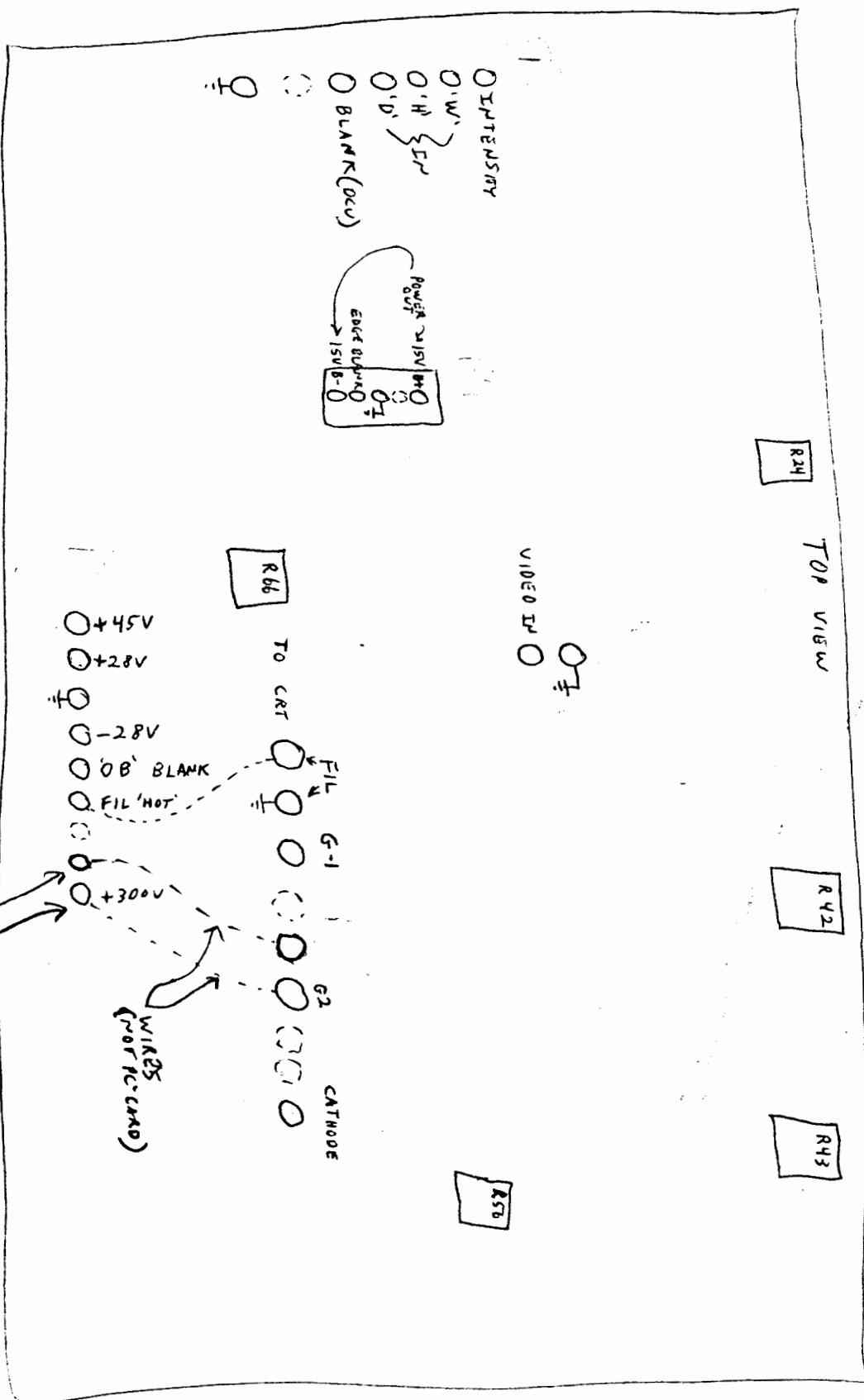


CRT DRIVER Jan 16/75



CRT DRIVER

PC-132 CATHAC-0



align mat

Note: System should be warmed up for 5 minutes before alignment is attempted.

①

Intensity offset -

Turn N28 card off

$HIN = 0V$

$V_{in} = 0V$

$D_{in} = 0V$

intensity pot adjust very low.

adjust R45 for no visible picture or no video on CRT cathode

②

Black level - Self explanation

③

Low level exposure adjust -

adjust tube cathode

(Low level intensity)

(adj intensity to zero and just turn CRT spot out) Black level is

R56 cathode

- .7 volt pin 12, IC10, video in grid SCD sync and intensity for a picture. (very low level, small sig)

adjust "exposure" adjust for constant

video intensity as picture changes sig.

④

Back pt adj -

adjust size of intensity

until shading error appears

try adjusting R56 until best

shading vs. intensity occurs

**RE**

RUTT ELECTROPHYSICS  
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- 11) ADD 20.102 IN SERIES WITH B-TO Q-2, R-51, C-18
- 12) CHANGE C-18 TO 15 $\mu$  20V TANT (+ IS GND SIDE)
- 13) Change C-16 TO 15 $\mu$  25V
- 14) OMIT C-13 (BE SURE TO CHANGE R-27 GND)
- 5) PUT RESISTORS IN SERIES  
WITH  $\pm 28V$  TO LIMIT 40409010  
DISAPPEAR

~~6) Change C-21 to 10 $\mu$  60V, or 27V  
-BATT. TO GND~~

7) 11 R-44 TO 10K FROM 100K  
(Change multi. on parts list)

8) 11 R-54 TO 220K  
(Change notes on parts list)

9) ADD 470K FROM (C-22, R-28, 22) TO PIN 2 4IC-8  
THIS OFFERS LOG CIRCUIT TO HELP LEARNIZE  
INTENSITY INPUT

10) Change R-44 FROM 10K TO 4.7K  
Change notes on parts list

NOTE a) '1' WHITE SINEWAVE IS 'OFF' WHEN  
POT IS C.W.

b) R-46 + R-47 CONTROL GAIN OF MULT. AMP.  
IF GAIN IS TO HIGH (TO MUCH CONTRAST) RAISE  
THEIR VALUE (IN PROPORTION) & YOU WILL REDUCE GAIN  
& LOWER C-9 BY THE SAME PROPORTION



Wash with N.O.D.

(Oven for alignment in next)

Marked (\*) resistors are 100 ohms (previously metal film) (different size)

Heating  $\pm 15V$  Noise

1K: 2K  
25 INCREASING  
FROM 100/13

Ground plane

Leads TC2, 4, 5, 6, 7, 8 (approx 1 inch) from TC9 for thermal

resistor

Short length RT cathode lead

You can more imparts (via H in D in) together to a convenient spot

Vibes in cannot be moved

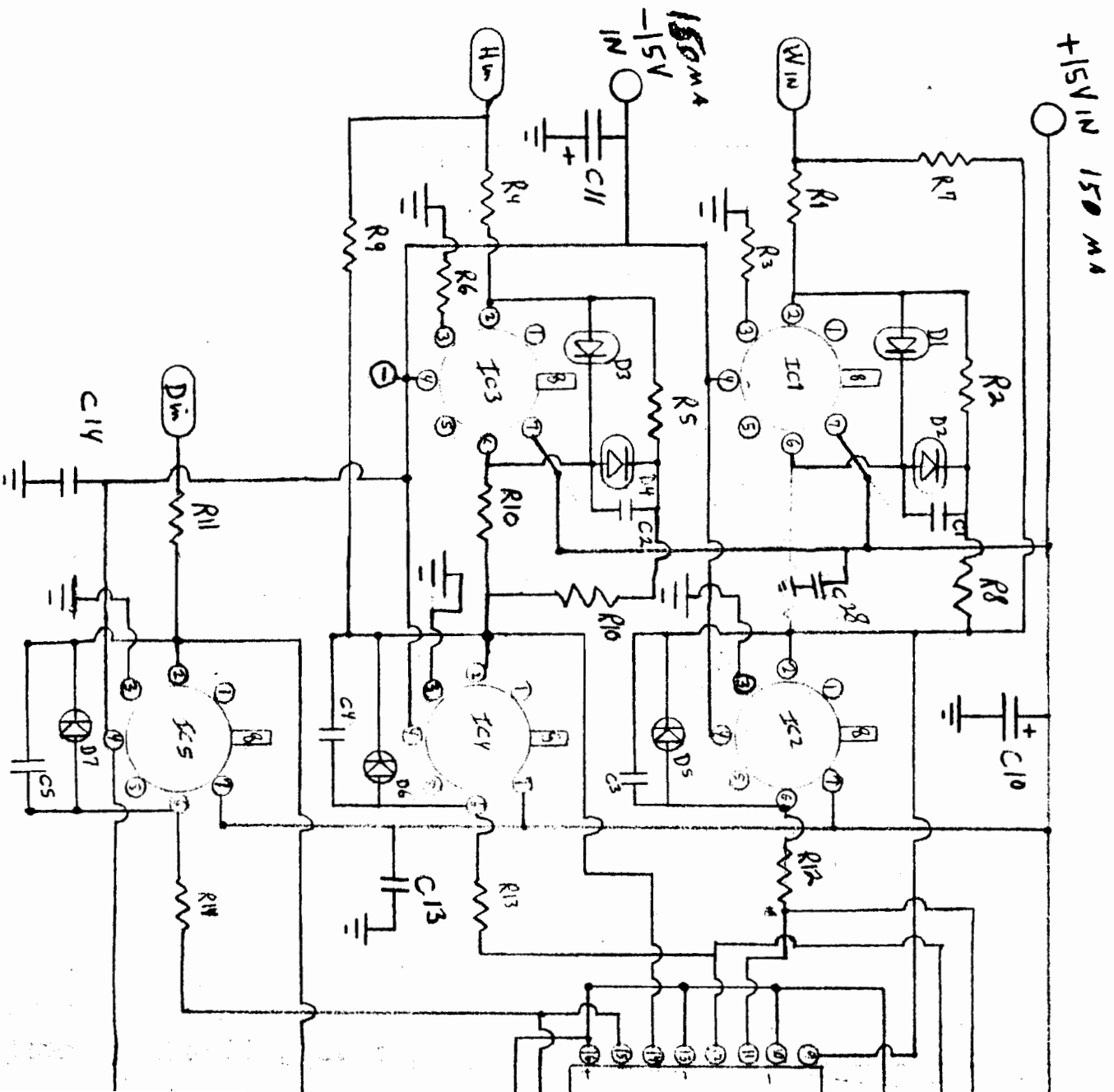
Vibes 752 lead is now of BNC Panel connects

Q-34 4 STAPLED

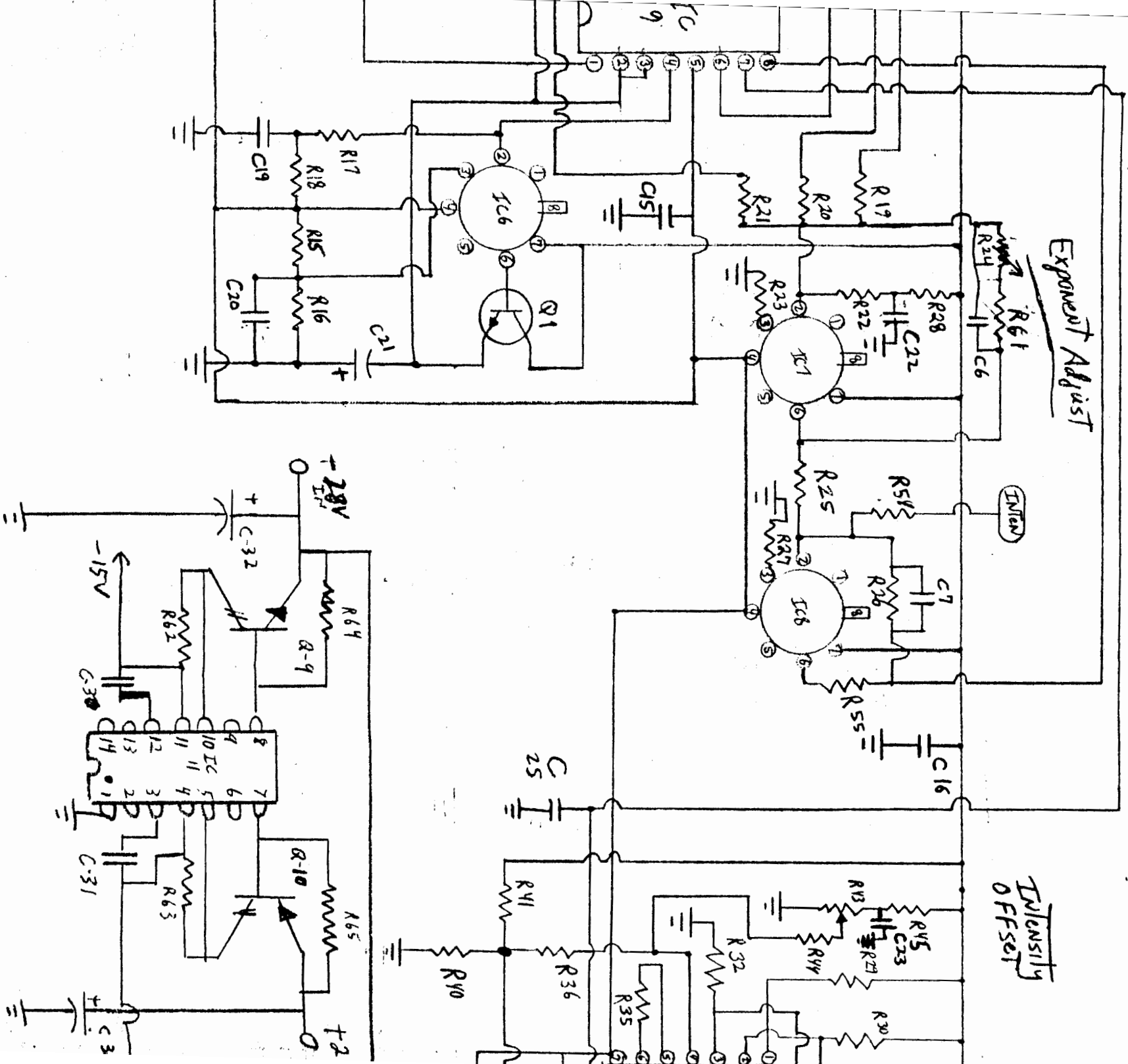
BZ TIED

TO GROUND

for heat transfer with silicone



1



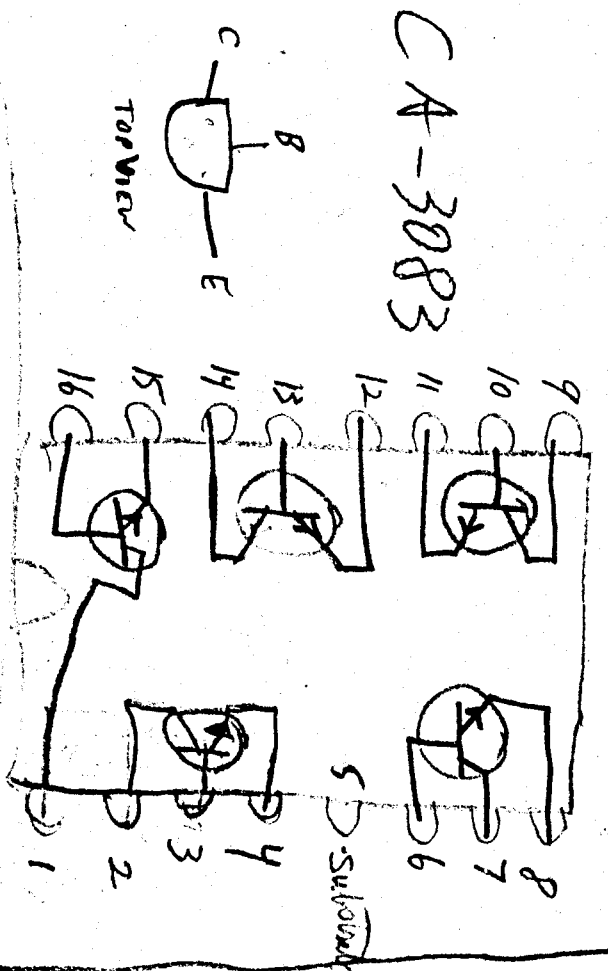


# PC-132 VIDEO DRIVER CLOCK CIRCUIT

1) R30, IC-10 pin 2, Q-4 base ARE NOT SUPPOSED TO GO TO -15V

2) IC-10 pin 7 & OTHER COMPONENTS ON SAME WIRE SHOULD ALSO GO TO -15V

3) R-44 IS NOT GROUNDED



4) IC2 Pin 2 & 4 are MESSY UP  
CONNECT PIN 4 TO B-  
cut B- from pin 2 - connect pin 2 TO D5 & 23

21) Change G-1 FROM 0 TO -28 TO  $\pm 15$

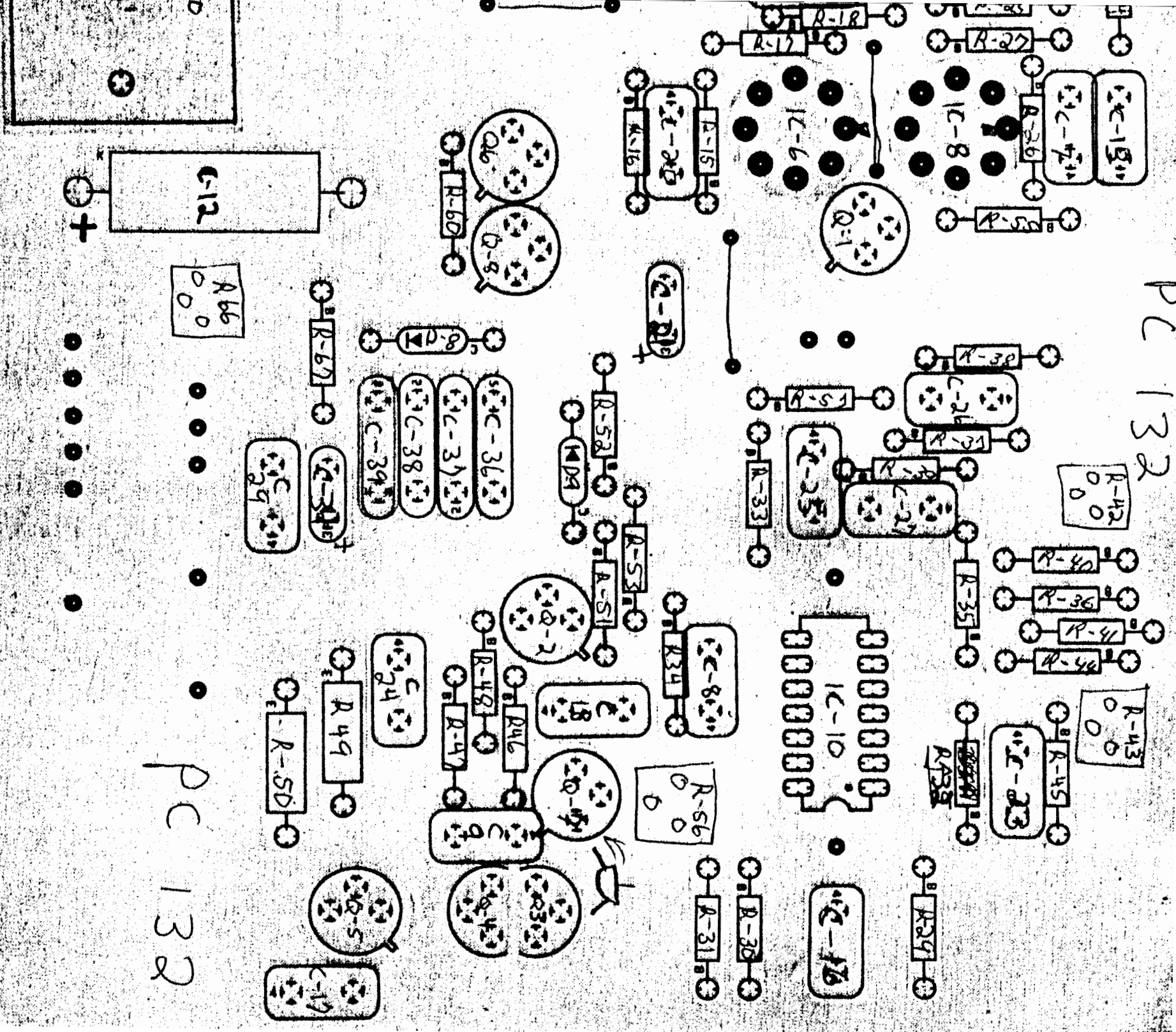
22) Convert R8 & R10  
ON IC4 & IC-3  
THEY GO TO WRONG PINS

21) 400	Resistor for power with +45V in
19) Adjust VALUE of R61	
20) PUT LIMIT POT ON INTENSITY (OCU) & BIAS POT TO SBT POT. AS SPECIFIED	
18) 400 10K Res IN SERIES w/ 6-2	
17) PUT 47K potentiometer IN SERIES WITH CATHODE	
16) 400 33K RESISTORS	IT'S READ OF COMPRESS 0.1 + 0 - 28V TO 564501
15) 400 10K CAP TO IC-8 pin 2-6	

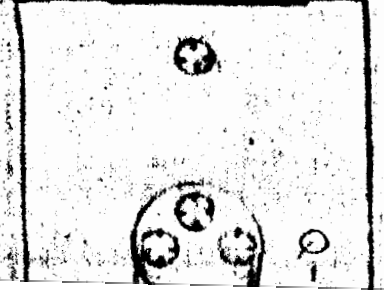
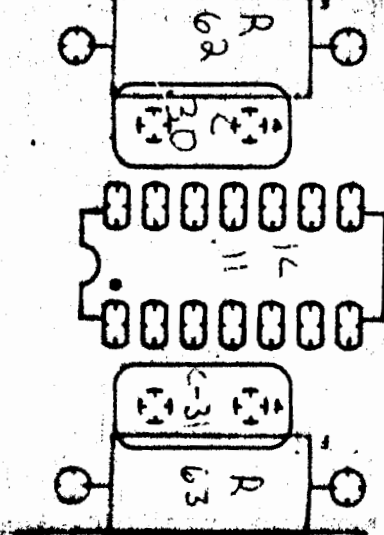
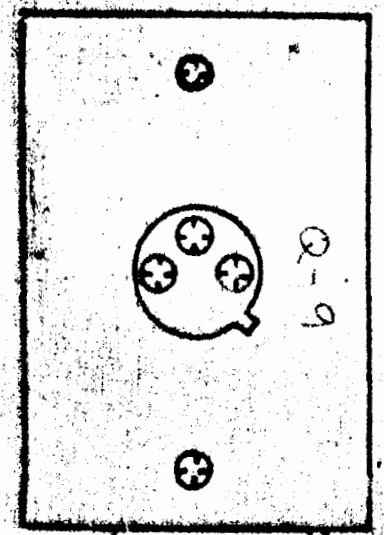
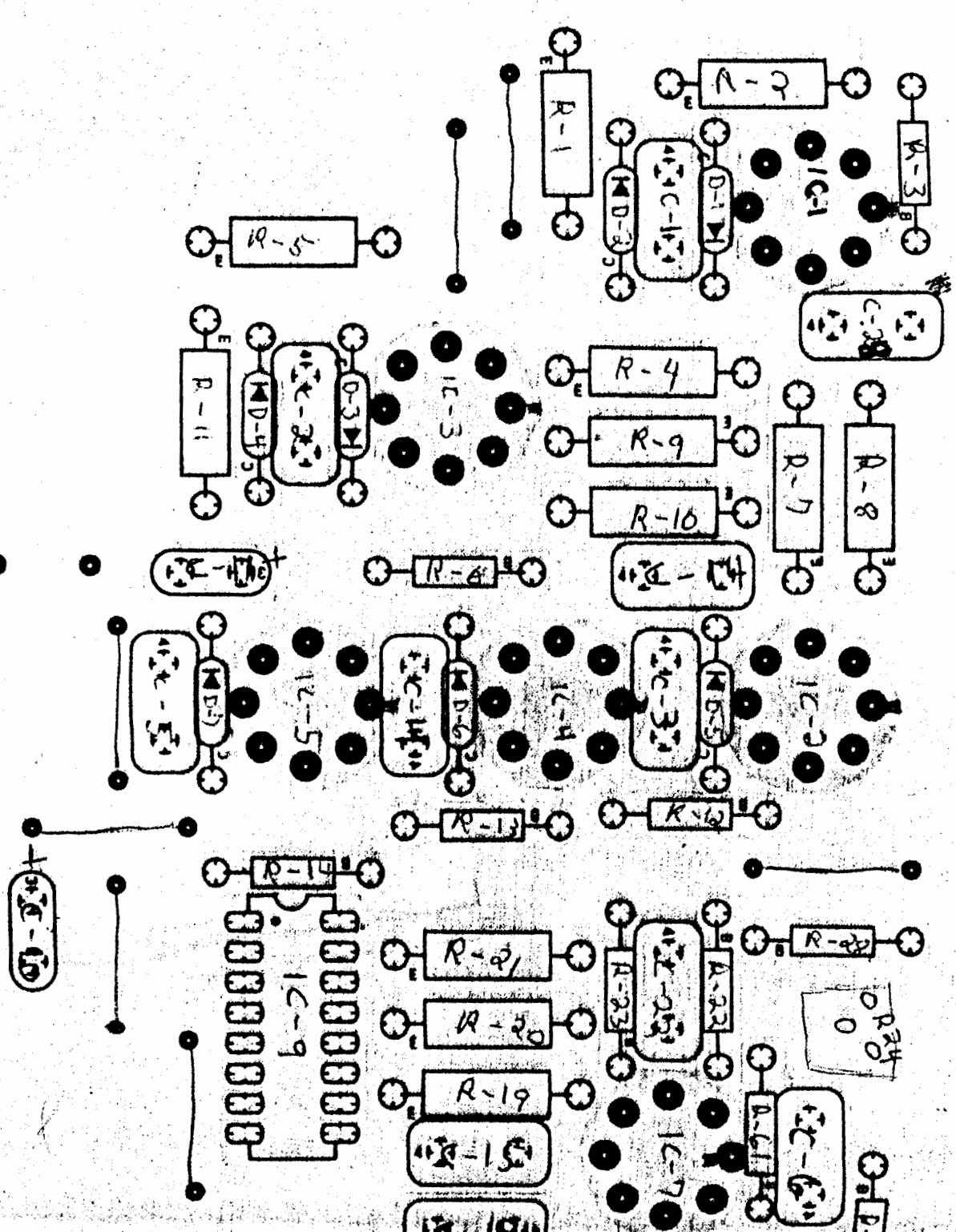
OVER



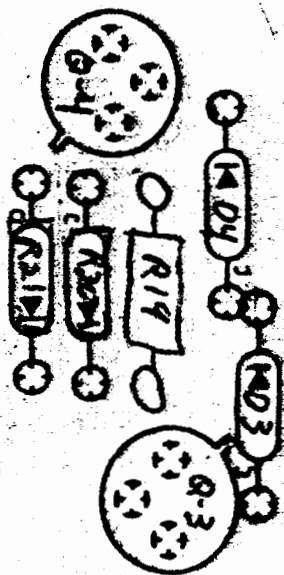
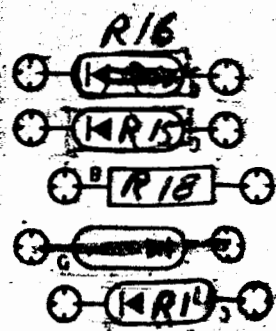
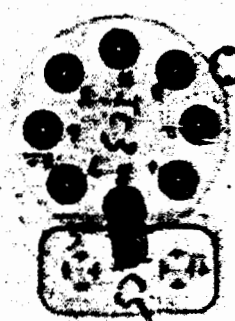
PC 132



PC 132

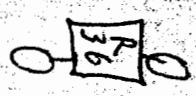


R-28  
R-29  
R-33

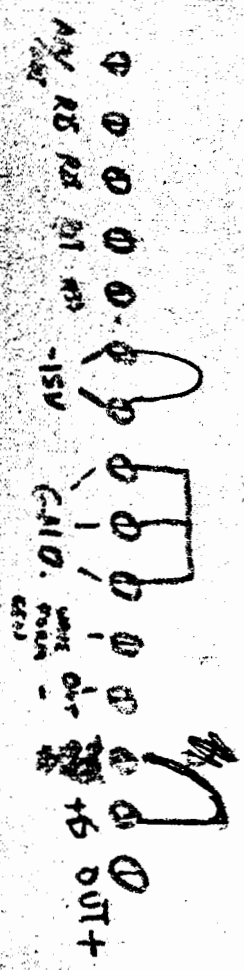


R1

C-9

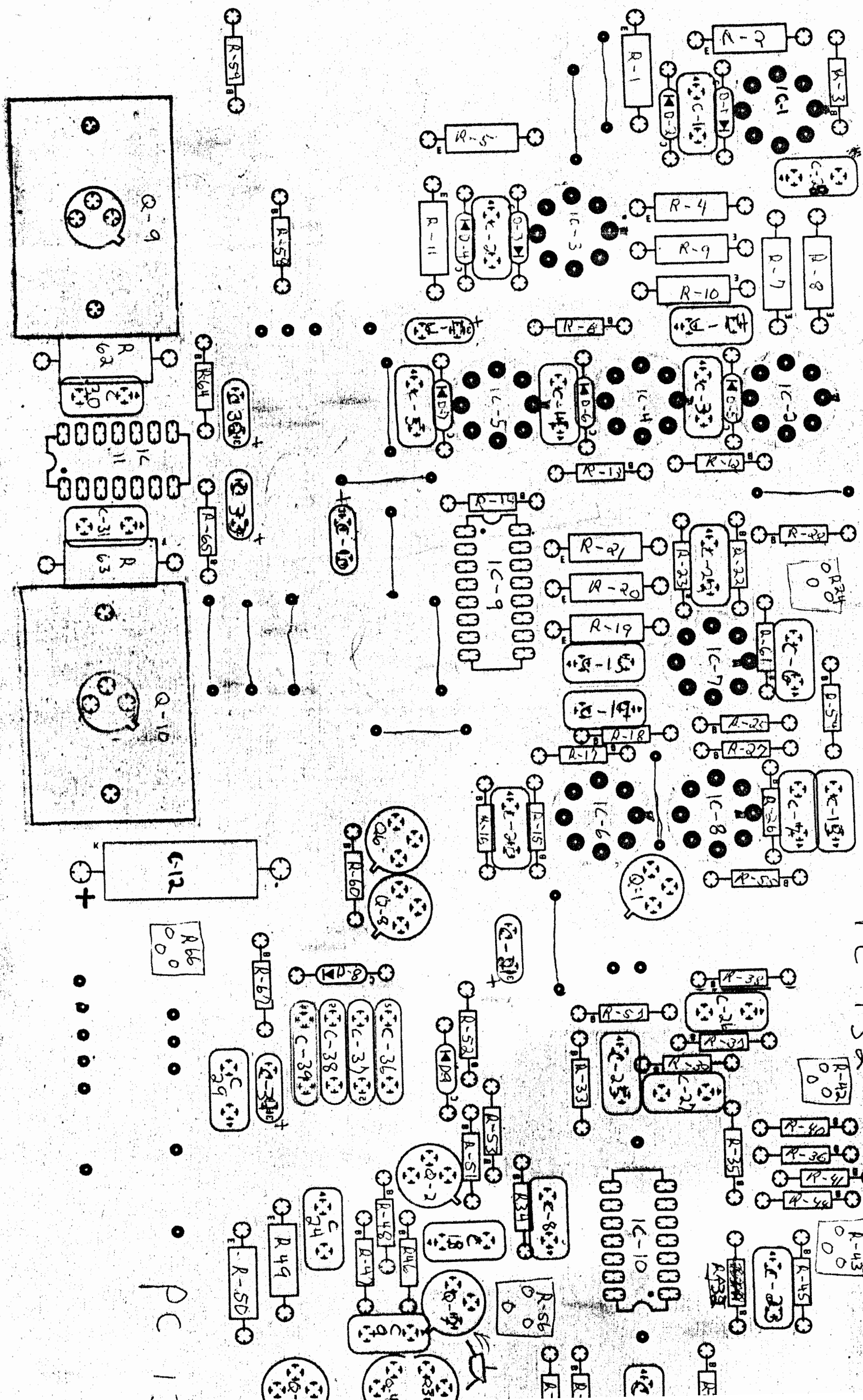


R-25





PC 132



PC 132